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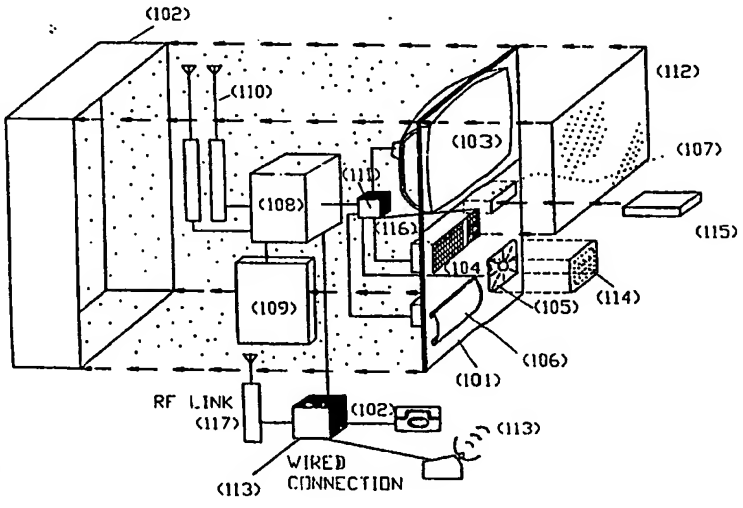
(57) Abstract




The invention refers to a combined method of wire and wireless 2-way continuous communication between people, vehicles and equipment, that is applicable to urban centers and greater areas, seeking to satisfy requirements and supply services towards the residents of the application area, mainly providing: information and guidance of people, while walking in the areas of application; information, guidance and processing of embarcation, disembarcation and booking for public transport services; control and guidance from a control centre for the coordination, safety and effective movement of fleets (fleet management) consisting of groups of vehicles (i.e. police, delivery, ambulance, fire trucks etc.); information for finding parking spaces, guidance and processing of the parking procedure in parking lots; integrated system for alarm and immediate coordinated action, caused by violent act, terrorist activity, fire or health emergency situations; automatic notification of the corresponding service and action towards traffic regulation in case of unexpected events (i.e. traffic accident), providing priority to certain types of vehicles; exchange of messages between pedestrians or vehicle drivers in the areas of application (mobile telephony); automatic call and tracking of hired vehicles (TAXIS); hotel reservations, athletic events, concerts etc., with detailed information about seat availability, schedules, prices etc; surveillance of the road network of a greater area, and information of drivers for ice on the pavement, flood, fog, or gust along a road segment, or an atmospheric pollution incident. The method is supported by digital maps, databases, Central Control and Data Processing Unit, supporting units and a position estimation method.

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# INTEGRATED METHOD OF GUIDANCE, CONTROL, INFORMATION, PROTECTION AND COMMUNICATION.

The invention refers to a combined method of wire & wireless 2-way continuous communication between people, vehicles and equipment, that is applicable to urban centers and greater areas, seeking to satisfy requirements and supply services towards the residents of the application area, mainly providing:

1. Information and guidance of pedestrians, while walking in the areas of application.
2. Information, guidance and processing of boarding, disembarkation and booking for public transport services.
3. Control and guidance from an Operations centre for public transport services.
4. Information for finding parking spaces, guidance and processing of the parking procedure, in the parking lots.
5. Control and guidance from an Operations centre for coordination, safety and effective movement of fleets (fleet management) consisting of groups of vehicles (ie. police, delivery, ambulance, fire trucks etc.).
6. Integrated system for alarm and immediate coordinated action, caused by criminal or terrorist activity.
7. Administration, control, communication and information system for military forces in a greater area, providing coordination of defensive and offensive operations.
8. Protection and tracking of stolen vehicles.
9. Alarm and building protection system (houses, offices, factories etc.).
10. Automatic distress call of the appropriate agency and simultaneous presentation of a person's ID, for emergency situations, providing coordination and guidance for position tracking and first aid (ie. distress call due to health problem, fire, breakdown etc.).
11. Traffic regulation in cases of traffic congestion.

12. Automatic notification of the appropriate authorities and action towards traffic regulation in case of unexpected events (ie. traffic accident, immobilization etc.).

13. Exchange of messages between pedestrians or vehicle drivers in the areas of application (mobile telephony).

14. Automatic call and tracking of hired vehicles (TAXIS).

15. Continuous information, booking, ticketing and guidance to hotels, theaters, athletic events, concerts and recreational areas of general interest.

16. Traffic regulation providing priority to emergency vehicles (ambulance, fire trucks, police) and a better service to the public transport of people.

17. Surveillance of the road network of a greater area, and information of drivers for ice on the pavement, flood, fog, or gust along a road segmnent, or an atmospheric pollution incident.

The method is unified (ie. supports a number of applications without the need to adjust it to the specific application) and integrated (ie. fits with the existing layout of the area or buildings, providing complete coverage of the service), with the following characteristics :

a. Coverage of the predetermined urban center, city or greater area with a large number of INFORMATION and COMMUNICATION STATIONS (figure 1), each consisting of a central processing unit, memory unit, input/output units, transmitter and receiver, where the stations constitute a network with a CENTRAL CONTROL UNIT and DATA PROCESSING UNIT, where the stations transmit data and are controlled.

b. Supply of the people, vehicles and buildings or areas that the method covers with a PORTABLE, PERSONAL, INFORMATION and COMMUNICATION DEVICE (figure 2), which communicates, either by wire or wirelessly with the said STATIONS, in such a way that people, vehicles, buildings and areas are able to communicate, inform, require service or assistance, through the PORTABLE PERSONAL INFORMATION AND COMMUNICATION DEVICE, and then through the installed STATIONS from the CENTRAL CONTROL AND DATA PROCESSING UNIT,

which in turn informs and activates people, vehicles and services, responding accordingly depending on the specific case.

c. Digitization of the mapped area of application, insertion of selected information in the data base of and positioning of moving or non-moving targets on the map.

The network of the INFORMATION CENTERS and COMMUNICATION, or the CENTRAL CONTROL UNITS and the PERSONAL INFORMATION UNITS constitute a kind of a "neural network of the city", emerging from a variety of services and needs which are a result of the variety of applications and information, that are directed from people, vehicles, areas or buildings, towards the CENTRAL CONTROL UNIT (i.e. requests for help, transportation, information, notification etc.) and from them, the corresponding notification, information, guidance, control etc. where is routed to the appropriate people, vehicles, services, depending on the specific case.

## DISCLOSURE OF THE INVENTION

In order to address existing problems the invention foresees:

a. Coverage of the area in question which is:

- urban centre
- part of an urban centre
- city or town
- part of a road network
- tourist resort
- agricultural or industrial zone etc.

with a number of INFORMATION AND COMMUNICATION STATIONS (I.C.Ss) which are installed in selected locations avccording to the nature and quantity of services and problems which they are required to offer or solve respectively within the method. I.C.S installation locations are:

- transportation nodes
- shopping malls

- public services etc.

In all cases however. the I.C.Ss must cover uniformly the area in which they are located.

b. The I.C.Ss are connected to a network and are controlled by a C.C.U, which unit in its embodiment is an operations centre equipped with a data processing unit. Dedicated telephone lines are recommended for the connection of the I.C.Ss with the C.C.U.

In another embidiment a wireless, satellite or special cable connection is foreseen. The C.C.U in one embidiment is an operations centre dedicated to the embodiment of the method, i.e. to the support of the I.C.S operation irrespective of the service provided. In another embodiment the C.C.U coincides with the operations centre of an existing service such as:

- military unit operations centre
- crime prevention operations centre
- fire brigade operations centre
- first aid centre
- fleet tracking centre (truck, taxi, bus, etc.)

For the full coverage of all the services offered by the method, the following two embodiments are foreseen:

(1) In the first embodiment the I.C.Ss are connected (mainly through the telephone lines) with more than one operations centres, each of which operates with the help of a C.C.U. In this embodiment each I.C.S is responsible for selecting from the available data that concerns each operations centre and through the respective connection distributing it accordingly.

(2) In the second embodiment the installed I.C.Ss are connected (preferably) via telephone lines to a single C.C.U to which they relay data and which in turn controls their operation, while each independent service or operations centrecommunicates with the C.C.U which in this case is responsible for the distribution of data to the various operations centres. Obviously all permutations and

combinations are within the scope of the invention.

c. Individuals interested in the use of the system, their vehicles whose movement and control are managed by the system, as well as the areas and buildings which provide services offered by the system are equipped with a P.P.I which performs the following functions:

(1) Communicates wirelessly (although wired connection is also foreseen) with the I.C.Ss. The communication is reciprocal and in practice the network makes possible the communication between each P.P.I with each operations centre or C.C.U.

(2) It is utilised as a personal recognition and debit card, which uses the I.C.Ss of the method.

The abovementioned wireless communication has a low range. The installation of the network of I.C.Ss aims in one part to cover densly the region of interest, so that each P.P.I has within its range a C.C.U, and in another part to map in digital form the area in question so that when an operations centre receives data from a C.C.U, and hence a P.P.I, it can locate with high accuracy the region where the P.P.I is found.

In general terms, the mode of opereation of the method is as follows:

(a) A P.P.I is activated and transmits a signal to the nearest I.C.S. Activation is initiated :

* By an individual using the method and possessing the P.P.I.

* Automatically or by the driver of a vehicle in which a P.P.I is installed.

* Automatically or by some user within a building, as long as that space is covered by the services of the method.

The transmitted signal is:

- an alert signal due to some imminent threat
- Distress signal ofa medical nature
- Fire or flood alert signal
- Distress signal from an immobilised vehicle
- Position signal indicating the location of the P.P.I
- Signal requesting parking space

- Signal requesting a taxi for hire
- Signal requesting communication with
    * some professional
    * some business/service
    * some vehicle
- Information request signal
- Signal indicating pollution levels in a region
- Signal carrying a message to some other user of the method

(b) This signal is received by the nearest I.C.S and classified according to its content with the operations centre or the C.C.U which it addresses.

(c) Following this, the signal
* is encoded
* is assigned a priority
* is expanded with the addition of the position code of the I.C.S
and then relayed to the corresponding operations centre or C.C.U. Finally, the signal reaches the appropriate service.

(d) According to what it offers and the nature of its operation, the service takes, through the operations centre or the C.C.U, the following actions:
- Updates itself on the state or position of the individual, vehicle or building which transmitted the signal (as in the case of the surveillance of an individual, fleet of vehicles, a building, an area etc.).
- Responds, via the I.C.Ss, to the user who sent the signal (e.g. when he has requested some information).
- Notifies other individuals or services concerned with the signal and located within the city centre and subsequently informs the user.

* When the user requests a parking space, the operations centre requests and books a space in the nearest to the one requested parking lot and subsequently informs the user.
* When the user requests a meeting with a professional e.g.

an attorney, the operations centre attempts to locate him and notifies subsequently the user.

- Immediately mobilises the service's resources (e.g. its fleet of vehicles) transmiting corresponding signals via the I.C.S and giving instructions for the timely resolution of the problem, for example:

* call for an ambulance
* dispatch of a fire engine
* cordoning-off of an area by the police force
* dispatch of a taxi etc.

Depending on the nature of the signal transmitted by the P.P.I, on the operations centre of the concerned service and on the response, it is possible to derive the number of services offered and the problems that can be addressed by the method.

The general principles concerning each of the services offered, are described herebelow:

1. Information and guidance of pedestrians, while walking in the areas of application of the method.

The individual uses the P.P.I. and requests information or instructions from the nearest I.C.S., which is received either directly from the memory unit of the I.C.S. or through the C.C.U.

2. Information, guidance and processing of the boarding, disembarkation and reservation procedures for public transport means.

The individual upon using the P.P.I., requests from the nearest I.C.S. an information or instructions concerning a bus line or a combination of bus lines to enable his/her transfer from one location to another, and thereafter he/she is charged with the relevant ticket price. From the I.C.S., the charge data are trasnmitted to the respective C.C.U. and to the Operations Centre of the public transport means in order to register the applicant's seats and itineraries.

3. Control and guidance from an Operations Centre for Public transport means.

Each public transport means located in the application area is equipped with a P.P.I., which transmits a signal towards the I.C.S. identifying the vehicle. Through the I.C.S. network, the C.C.U. and the Operations Centre control the movement and position of the vehicles. As a result, and combined with service (2) hereinabove, they can estimate the number of passengers, their position, the bus stop etc.

4. Information for finding parking spaces, guidance and processing of the parking procedure in parking lots.

The driver moving his/her vehicle within the area of application, through the in-vehicle P.P.I. and the I.C.S., informs the Operations Centre about his/her destination and requests a parking place in the nearest parking lot. The Operations Centre, through the I.C.S., communicates with the parking lots of the area and books a place for the applicant. For the embodiment of this service, an on-line connection is established between the Operations Centre and the parking areas, through the I.C.S., so that the Centre is always aware of the vacancies.

5. Control and Guidance from an Operations Centre for coordination, safety and effective movement of fleets, consisting of groups of vehicles.

Each category of vehicles employed by the same carrier (e.g. transportation trucks, police cars, fire engines, taxis etc.), is equipped with a P.P.I. which transmits to the I.C.S. network the identification of each vehicle. The I.C.S. network transmits to the C.C.U. and the respective Operations Centre, the position of each vehicle (which is identical to the position of the I.C.S.). The Operations Centre is continuously aware of the position of the fleet within its area. The Centre also transmits to the vehicles,

messages with guidance or instructions through the I.C.S. and the in-vehicle P.P.I.

6. Integrated system for alarm and immediate Coordinated Action caused by criminal or terrorist activity

The individual being assaulted activates the distress (S.O.S.) signal of the P.P.I. and both the Operations Centre and the C.C.U., through the I.C.S., are immediately informed of the assault. Thereafter, through the I.C.S., the fleet of police cars is mobilised in order to coordinate their actions for blocking the area where the S.O.S. came from. In case of firing or explosion, the distress signal is automatically transmitted from the P.P.I. (by a special sensor).

7. Administration, control, communication and information Service for military forces of a wider area and coordination of the defensive and offensive operations.

A complete view of the military operations field and rear lines is displayed on monitors installed in the Operations Centre of the army, in the office of the Minister of Defense and elsewhere, accurately indicating the positions of all mechanised or not military units involved in war activities. The operations are displayed on digitised maps enabling the appropriate authorities to monitor and direct the military operations in real time.

8. Protection and position tracking Service of stolen vehicles.

The vehicles under protection are equipped with a P.P.I. which, while the vehicle is in motion, transmits the I.D. and a particular signal in case of theft. The owner of the vehicle, has to key-in a password in order to disconnect the P.P.I. In case of theft, the P.P.I. which is not disconnected, continuously transmits signals to the

Operations Centre, through the I.C.S., indicating the position and the vehicle I.D.

9. Alarm and building protection Service.

A P.P.I. is installed in buildings (houses, factories, shops) of the area of application and in case of emergency (robbery attempt, fire, flood etc.) transmits a distress signal to the nearest I.C.S. indicating position and I.D. The corresponding C.C.U. and the Operations Centre instruct the vehicles to proceed for detection and prevention. The activation of the in-building P.P.I. may be also performed by a micro-transmitter carried by individuals or objects (e.g. safes) in the building.

10. Automatic distress call of the appropriate agency and simultaneous presentation of a person'a I.D. for emergency situations, providing coordination and guidance for position tracing and first aid service.

The individual that detects a hazard (fire, health problem etc.) activates this service through the P.P.I. and the I.C.S. and informs the authorities through the C.C.U., which in turn instruct their forces to handle the emergency (i.e. dispatch an ambulance, provide instructions, dispatch fire engines etc.).

11. Traffic regulation Service in cases of Traffic congestion.

Sensors installed by the appropriate agency are located along the width of roads, and measure the number of passing vehicles, through the I.C.S. and the C.C.U. When the vehicle output is significantly lower than the input, the drivers are informed thereof, through the I.C.S. The information is either in the form of variable message signs (VMS) placed alongside the road or through an in-vehicle automatic guidance system. The V.M.S.s display the road

network, parts of which are shaded in black to denote traffic congestion.

12. Automatic notification of the appropriate authorities and action towards traffic regulation Service in case of unexpected events.

The in-vehicle P.P.I. may be either activated by the driver, in case of immobilisation or damage, or automatically in case of collision, whilst the C.C.U. is informed through the I.C.S. about the disorder of the traffic flow and the resulting problem. The Operations Centre of the competent authorities instructs its forces and through the I.C.S. and the V.M.S.s or guidance systems, the drivers are advised of the traffic flow disorder.

13. Exchange of Messages between pedestrians or vehicle drivers in the areas of application Service.

A driver from the in-vehicle P.P.I. transmits through the I.C.S. and the C.C.U. short messages towards another P.P.I. installed in a vehicle or carried by an individual or installed in a building. The C.C.U. and the Operations Centre immediately or in due course (mobile telephone) carry out the procedure.

14. Automatic call and tracking of hired vehicles (TAXIS) service.

The user of the P.P.I., through the I.C.S, informs the Operations Centre and the latter, through the C.C.U. and the I.C.S., the nearest available taxi in order to serve the customer.

15. Continuous information, booking, ticketing, and guidance to hotels, theaters, athletic events, concerts and

recreational areas of general interest service.

The users of this service may be informed the address, the availability or the working hours etc. of the above areas, and they may also book a seat from a distance and request guidance towards the destination, concerning the public transportation means, the exact itinerary and detailed instructions to avoid congestion and delays.

16. Traffic regulation providing priority to emergency vehicles service.

Vehicles used in emergencies (ambulances, fire engines, patrol cars) during their movement transmit a signal from their P.P.I., through the I.C.S. and the C.C.U., to the Operations Centre requesting priority to pass. Accordingly, the Operations Centre through the I.C.S. and the V.M.S.s, placed alongside the road arteries, or the navigation system, requests the evacuation of a lane or immobilisation of cars etc.

17. Surveillance of the road network of a greater area, and information of drivers for ice, fog, gusts or water, along a road segment, or an atmospheric pollution incident service.

Sensors detecting ice, fog, gusts and water, inform the Operations Centre through the I.C.S. and accordingly the Operations Centre informs the drivers, through the I.C.S., of the situation on the road surface. Other sensors are installed in the I.C.S. and near the sources of air pollution (like industries, boilers etc.) in order to keep the C.C.U. constantly informed of the levels of pollution in real time.

## CHARACTERISTICS AND ADVANTAGES OF THE METHOD

The advantages mentioned herein result primarily from the use of the method and secondlarily from its comparative

advantage with respect to other similar services. Thus,

1. The method is integrated, i.e. a number of PORTABLE DEVICES and STATIONS cover a range of a person's needs without the requirement for special devices or networks for every additional supported service.
2. The method is easily expandable so that it can satisfy any additional user needs.
3. The method is user friendly, allowing information access etc. via the P.P.I., and not by refering to services, tables etc.
4. The method is personal and not group based, in the sense that it addresses and resolves individual persons' needs and not those of a group.
5. The method provides easy reloading of and updating with new data.
6. Its operation is automatic.
7. It does not require densly packed wiring for every user.
8. It relieves people from the burden of printed documents and other informational documentation concerning movement and living within the areas covered by the method.
9. It reduces the existing number of services and employees who assist citizens, residents of and visitors to an area.
10. It is expected to rid cities from the visual "pollution" caused by all forms of signs, road signs and information plackards.
11. It opens up new opportunities for projection, advertisement, expansion, development of new sectors of the economy.
12. It is forseen to improve the structure and operation of the organic part of the area it covers, while at the same time it is expected to render safer for its inhabitants the covered area of the city.
13. It is "self-defensible" against malfunction or external breakage.

METHOD IMPLEMENTATION DEVICES

This section describes the devices which implement the method and in particular the INFORMATION AND COMMUNICATION STATIONS (I.C.S.), the PORTABLE PERSONAL or INSTALLED INFORMATION and COMMUNICATION DEVICE (P.P.I.) as well as the possibilities for the linking and communication of the I.C.S's with the CENTRAL CONTROL and DATA PROCESSING UNIT (C.C.U.).

The method requires the installation of I.C.S.s which cover the area of application of the method, namely:
- urban centres
- sparsely inhabited regions
- road networks and adjacent areas
- towns, villages, hamlets etc.

The number of I.C.S.s depends on the type of the region being covered.

* One embodiment option involves the wired connection of all STATIONS with a central processing system, in a star arrangement (see Figure 3).
* A second embodiment involves connecting the STATIONS to form a network in which each is connected with exactly two other STATIONS in a ring arrangement (see Figure 4).
* A third embodiment specifies that the STATIONS operate independently without being permanently connected to a network but with the ability to communicate amongst themselves, if this is required, by a wireless exchange of signals, in a specific region of the electromagnetic spectrum (see Figure 5).
* A fourth embodiment is a combination of the first and second embodiments.

In the case of the first and second embodiments, the connections are made according to the extent of the area:
- wire based using a network of communication channels
- wireless using receivers/transmitters in a specific region

of the electromagnetic spectrum
- using connection portions of other communications networks e.g. telephone service
- via satellite for wide area coverage

a. Information and Communication Station (I.C.S.)

Figure 1 presents an indicative embodiment of the construction details of an I.C.S. The front view of the I.C.S. (101) as well as its internal parts and its connections with the network (102) can be seen in Figure 1. In the front part of the STATION the following items are visible:
- The VDU (103) for the presentation of visual information in the form of text, images, shapes, diagrams and motion pictures according to the supplied information.
- Keyboard (104) for data entry.
- Loudspeaker (105) for the provision of audio information or warning signals (e.g. sounds) by the STATION
- Printer (106) for supplying printed information in the form of text, diagrams, figures, images etc.
- terminal connection (107) for linking with the PORTABLE PERSONAL INFORMATION AND COMMUNICATION DEVICE (P.P.I.).
- Protective reinforced transparent material for protection of the screen
- Protective wiring for the loudspeaker

These elements constitute peripheral units for communication of the user with the STATION and through this with the network. The devices included in the STATION's interior are the following:
- Information and data processing unit (108) which is connected:
(a) with the memory unit (109) which stores the information required for the implementation of each service offered by the method.
(b) with the unit (102) for connection with the other STATIONS of the network. Based on the above, this unit can

be:

* radio connection receiver/transmitter (RxTx)
* wiring
* satellite antenna
* telephone network

(c) with a receiver/transmitter unit (110) for connection with the P.P.I.s to which the STATIONS are linked via wireless connections.

(d) with the front - end terminals for data and information exchange (111).

For reasons of practical use, modifications are foreseen in order to best serve user needs. Within the general philosophy of the invention the following are foreseen:

- a special chamber in which the STATION is placed.
- a number of peripheral units (VDU, keyboard, terminal connection. loudspeaker and printer) for simultaneous servicing of more than one users. The arrangement is polygonal or in consecutive chambers.
- Covers for protection against direct or indirect sunlight.
- Ergonomic arrangement of peripheral units etc.

The operation of the STATIONS is described in detail in the sections presenting the implementation of every service offered.

b. Portable Personal or Installed Information and Communication Device (P.P.I.)

Figure 2 shows an indicative structure of the Portable Personal Information and Communication Device. This device is carried by the user who uses it for access and communication with the network of INFORMATION STATIONS. The possible modes of connection of the PERSONAL INFORMATION and COMMUNICATION DEVICE are:

(a) as a terminal

(b) wireless (Figure 4).

Figure 2 presents an embodiment of the PERSONAL DEVICE. The front view (or plan view) of the device (201) as well as the

interior are visible. More specifically, the PERSONAL DEVICE incorporates in the front or upper cover (201) the following:

- VDU (202) for the display of alphanumeric characters, figures and diagramms
- keyboard (205)
- loudspeaker for audio information (204)
- touch sensitive device (205) for tactile entry of data and information to the network (see Greek Patent Application # 910100339)

On the back cover of the device the following items exist:

- terminal for wired connection with the INFORMATION STATIONS (206)
- transmitter (207) and receiver (208) for wireless connection of the PERSONAL DEVICE with the network of STATIONS and with the user.

The interior of the device includes the following:

- the data and information processing system (209) which is connected with the above mentioned peripheral units
- system memory (210) which is connected with the data and information processing unit.

The operation of the above mentioned units is analysed in detail in the section presenting the implementation of each of the services which are anticipated by the method. Figure 2 shows a schematic arrangement of the various units. The philosophy of the invention incorporates the possibility of alterations in order to achieve better use, protection, ergonomic design etc.

1. Information and pedestrian guidance service

For this service, according to a first embodiment, neither the connection of INFORMATION AND COMMUNICATION STATIONS in a network nor the wireless communication with the PORTABLE, PERSONAL DEVICE is required.

Each STATION operates separately and serves the part of the area in which it is installed. Correspondingly, the

PORTABLE, PERSONAL DEVICES contain the terminal connection but not the wireless one. Especially for this service and according to another embodiment, the PORTABLE, PERSONAL DEVICE is replaced by a plastic or other card made of a rigid material which serves as a "ticket" for the use of the INFORMATION AND COMMUNICATION STATIONS. According to this embodiment, the recording on the card or "ticket" of an encoded symbol which implies characteristics of the card concerning the economic exploitation of the method is forseen. Such characteristics, contained in the encoded symbol are for example:

* Duration of use of the "card".
* Type of information and guidance to which the present "card" is allowed to have access, depending on its value.
* Extent of the information and guidance area which is covered by the "card".

According to this embodiment the "card" contains a simple surface for the registration of information (e.g. magnetic strip). On this surface, several elements are registered concerning the use of the card (e.g. destination area, user's personal details).

Returning to the first embodiment which foresees the use of a PERSONAL DEVICE, the commercial charging of the service is recorded in the memory which is allocated to chargings e.g. subscriptions. This part of the memory contains for example:

* Duration of use of the STATIONS
* Types of service which are allowed to be provided
* Area over which a charge may be levied etc.

As in the case of the embodiment with the "card", this is achieved by the issuing agencies recording on the memory unit an encoded signal (e.g. alphanumeric character) to which every command of the information and guidance program of the card processing system refers.

By inserting the card or, according to the first embodiment, the P.P.I in the corresponding slot of the I.C.S., the processing unit and the programme concerning pedestrian

information and guidance are activated. On the STATION display, a series of questions appear and a series of services covered by the "card" or the PORTABLE DEVICE code are presented. At the same time, if the user wants, the same is provided in an audio form.

Details for users' information purposes only, and covering the area in which the I.C.S. is installed as well as the wider area covered by the method is registered on the memory unit of the I.C.S. In essence, the extent of the area covered by the information kept by each I.C.S. depends solely on the size of the memory unit with which it is equipped and on the number of the registered elements.

It is reported here that, "schematically", the memory unit contains a detailed "contour" map of the area which is covered by the STATION, on which the topographical and any city plan of the area are recorded in a 3-dimensional form. The buildings and sites (archeological sites, stations, fields etc.) are placed on this layout and for each one of them, detailed information is provided concerning the type of

* professionals
* services
* persons

which it contains (e.g. for a appartment building, a detailed list of the persons, professionals and services housed is provided).

It is possible according to one embodiment, to represent data in the memory unit in a multitude of forms if for example a memory unit with image registration capability is used. For pedestrian guidance the memory unit covers by necessity the part of the area in which the I.C.S., from which the user requires guidance, is located.

If transport of the user to a point remote from the area of the I.C.S. is required, the I.C.S. transfers the requirement to the service (for example) of MASS TRANSPORTATION MEDIA (2), or car STOPPING (4), if the user wishes to be transfered to that area by car.

The use of the service foresees:

(a) Information for:

* Areas in the STATION territory
* Buildings
* Shops in the area
* Professionals of the area
* Services provided in the area
* Professionals, services, shops

(b) Guidance: The guidance foresees provision of instructions for the transfer of the pedestrian to any location within the area covered by the I.C.S.

In another embodiment the registration of the destination on the "card", in the registration area (e.g. magnetic card) or in the memory unit of the P.P.D. is provided. In this embodiment, by inserting the "card" or the P.P.D. in the I.C.S. slot, guidance is provided concerning the destination already registered. The guidance is provided with the following ways:

- OPTICALLY on the display
- ACOUSTICALLY through the loudspeaker
- WRITTEN FORM on the printer unit of the station
- PIECEMEAL through registration in the memory unit of the P.P.D. in order to be provided in parts, during the pedestrian's progress towards his destination.

The guidance contains:

- Instructions for movement at the level of the street,
- Instructions for ascending or descending in areas of multiple levels,
- Instructions for movement in closed areas

For the provision of these instructions, the processing system takes into account the topographical layout of the covered area, where the term layout refers to the internal arrangement of the area.

A second embodiment, foresees the connection of networked I.C.Ss with a central processing unit, which is used for the automatic updating of memory unit data so that it corresponds to the changes which frequently happen in the

covered area. In addition to the above, if the central processing system of the network is linked to:
- Buildings, Shops, Services
etc.
any user of the method can, through the I.C.S.,
- arrange an appointment
- notify about his time of arrival
- request a type of service or merchandise which he wishes (e.g. type of food that he wishes in a restaurant)
and notify through the guidance service for possible time of arrival time on foot or by car.

2. Information and guidance service used by public transport means

In this service, the user is informed and guided in connection with the appropriate public transport means which he/she should use and is facilitated during the procedures of issuing tickets, embarking, disembarking and transfer to the boarding stop and from the boarding stop to the final destination.
In a first embodiment, the devices used for this purpose are the following:
- The INFORMATION AND COMMUNICATION STATIONS (I.C.S.) connected to a network, preferably in a ring form in the embodiment (2) or connected to a central processing system in the embodiment (1).
- The PORTABLE PERSONAL INFORMATION AND COMMUNICATION DEVICES (P.P.I.)
- Especially for this service and for certain characteristics the installation of I.C.S. of small range, volume and capabilities is required in every public transport mean covered by the method. Due to the specialised service provided by these STATIONS they are named "VERIFICATION AND COMMUNICATION BOOTHS" (V.C.B.)
- Finally, for the dispatch of the reservation procedures the method provides for the connection of at least one I.C.S. with the data management unit for the reservation and

timetable of each service and public transport agency. Figure (8) presents the arrangement of the service equipment i.e. the network of the I.C.S. connected in ring form and the company timetable management systems connected to one I.C.S. (the nearest).

The timetable management system of each agency, wirelessly communicates with the V.C.B. which are installed on board every public transport mean (buses, trains etc.). The communication is both direct as shown in Figure (6) and indirect through the I.C.S. network at the time the transportation mean transits each station. Finally, the user communicates and is informed from the I.C.S. terminal and wirelessly by the V.C.B. of the public transport means.

PHASE 1: Routing and listing of the passengers and automatic charge. During this phase, the user connects the terminal of his/her P.P.I. with one of the I.C.S.

(a) for the routing and listing following are necessary:

In the memory unit of each I.C.S. the complete itineraries of the public transport means covering wide areas are registered. Thus a station covers:

* itineraries of urban service lines with buses, metro etc.
* itineraries of inter-city service lines (buses)
* itineraries of trains and domestic flights
* itineraries of domestic sailings
* main international lines of trains, ships and airplanes

In another embodiment, independent stations installed in travel agencies, airports, hotels etc. are provided and their memory units include the itineraries of public transport means of a wider area. After the terminal connection of P.P.I. with the I.C.S. the user follows the visual and audio instructions and inserts, in his/her option, the following details which consist the specifications for the trip:

(1) Departure point A and destination point B.

(2) Departure time from point A and required time of arrival

at point B.

(3) Desired transportation mean

(4) Conditions concerning the time of a day, weather or others for the duration of a trip.

(5) Special commodities of the desirable public transportation mean, e.g.

- to dispose of W.C.
- to dispose of reclining seats, etc.

(6) Particular characteristics of the seat booked by the passenger.

(7) Particular characteristics of the co-passenger where general or specific features are determined such as sex, age, nationality, profession, interests, spoken language etc.

(8) Desirable cost of his/her trip.

(9) Number and weight of baggages. The processing system of the I.C.S. executes the routing which includes selection of one or more trips to travel the distance from point A to B.

As soon as the said routing and selection of itinerary is accomplished, the passenger is charged and enlisted.

(b) For the charge of the trip, in this embodiment, a code number of credit account is assigned in the memory unit of the P.P.I. for the charge of the trip.

For the charge, two are the prevailing criteria:

- On the basis of the distance of trip
- On the basis of the duration of trip
- On the basis of the characteristics required by the passenger to be met

(c) Upon debiting the account, the passenger enlisting procedure may follow. From the I.C.S., through the network, the trip and passenger details are registered in the management systems of the transportation company and the reservations are verified. Finally, the passenger's details and the trip sepcifications are registered int he memory unit of the V.C.B. of the bus, train or aircraft which is to

be used for the trip.

During this phase, the service provides - following the same procedure - the transmission of a message to a particular passenger of a service line through the stations network. The passenger upon entering the transportation mean and upon verification, receives the waiting message.

PHASE 2: Guidance. In a first embodiment, the guidance phase includes:

(1) Warning throught eh P.P.I. concerning the time that the passenger has to be alerted for his/her trip.

(2) If the starting point A is not a stop or a terminal of a public transportation mean, which is used at the beginning of the trip, then:

- On the P.P.I. monitor, the itinerary to reach the terminal or stop on foot is displayed.
- If the trip is long instructions are given to reach the nearest I.C.S. on foot and obtain guidance instructions on how to reach the nearest terminal or stop.

(3) If the journey begins from some terminal (airport, train station) then, apart from guidance for reaching the terminal, a plan and instructions for moving within the terminal are also provided.

(4) Similar instructions for pedestrian guidance is given in every leg of the journey which might require leaving the terminal station and walking to another terminal.

(5) In order to certify his embarkation, the passenger, upon entering the public transport means, inserts his P.P.I in the corresponding slot of the V.C.B.

(6) If the passenger is carrying luggage, upon entering the station or the transportation vehicle.

(7) As the passenger disembarks or during his exit from the station he passes in front of the driver or controller carrying his luggage. Once again he inserts his P.P.I in a V.C.B slot and as a result thedetails of his luggage appears on the display of the V.C.B. The driver or controller checks that the luggage being carried truly belongs to him.

(8) As the disembarkation stop of each passenger approaches,

the said passsenger is notified verbally and then visually through his P.P.I. The V.C.B which is installed at each stop notifies wirelessly the passengers which must get off via their P.P.I. This is achieved by the V.C.B transmitting an identifying encoded signal which is received by the P.P.Is at some distance before the stop. If this code matches the code of the disembarkation stop of some passenger then that passenger is informed through an accoustic signal and at the same time disembarkation instructions are displayed on the screen.

(9) A similar process occurs when a passenger is awaiting at some stop. An encoded signal is transmitted by the approaching transportation means. This signal is received by the passenger's P.P.I and if it matches the signal of the required transportation service, the passenger is informed verbally and then visually.

(10) Correspondingly, if an individual is waiting at some stop in order to embark a specific vehicle, upon his inserting the P.P.I in a slot of the I.C.S a code is emitted and received by the V.C.B of the approaching vehicle. In this instance, the driver is informed, with a characteristic sound or image, to stop at the next stop.

## 3. Service of Control and Guidance from Operations Centre for Public Transport Means

A first embodiment provides for:

(1) Continuous tracking of each vehicle of a bus line by the Operations Centre which manages them.

Each vehicle is equipped with a P.P.I. which requires only the function of a low range transmitter for estimating the position. The transmitter transmits only the encoded vehicle ID which includes:

- Urban bus line (e.g. 146)
- Number of vehicle (e.g. 14)

The signal is captured by the I.C.S. network covering the urban area in question. For tracking purposes each I.C.S. receives the transmitted signal from each vehicle and

transmits it to the C.C.U. and Operations Centre. The Operations Centre receives both vehicle IDs and the position of I.C.S., which transmitted the IDs and therefore the location of the station where the vehicle is in, can be estimated.

In this embodiment, a relatively small number of I.C.S.s is uniformly distributed in the area of application and covers all the bus lines and vehicles' itineraries.

(2) Two-way communication between the driver of the service line and the Operations Centre. In order to transmit a message to the Centre, the driver uses the following:

- the keyboard
- the device for communication by the sense of touch of the in-vehicle P.P.I. Following are provided:

(a) Transmission of standard messages which are simply characterised by an encoded ID also transmitted. The encoded ID is received by the Operations Centre, through the I.C.S. network, and a standard message is displayed.

(b) Transmission of non-standard messages keyed-in by the driver on the P.P.I. keyboard, which are transmitted to the nearest I.C.S. and thereafter to the Operations Centre, e.g.

- A series of code numbers corresponding to the commuters' ticket numbers. This is automatically achieved by the ticket invalidation device provided in the Service of Information, Guidance and Processing for Boarding / Disembarkation Public Transportation means (2).

Using the reverse procedure, the Operations Centre through the C.C.U. and the I.C.S. network may transmit standard or non-standard messages. Likewise, the messages from the Operations Centre to the vehicle are supplemented by the vehicle's ID, namely:

- Number of bus line
- Number of vehicle

Using this procedure it is possible for more vehicles circulating in the same area to receive the message which is decoded at and received by the identified vehicle.

It is, however, possible in case of a message addressed to an I.C.S. installed far away from the vehicle's position at the time, to be kept in the memory and transmit it to the particular vehicle when it arrives at the area of I.C.S. installation, upon receipt of the vehicle's identification.
These alternatives provide following capabilities:
(a) Direct communication between vehicle and Operations Centre for information, data and message exchange.
(b) Exchange of messages transmitted by each I.C.S., in such an order to better service the coordination of vehicles' movement.

In another embodiment following is provided for:
(1) In order to estimate the position of each vehicle belonging to a bus line, it is equipped with an automatic navigation and guiding system. This system includes among others:
- An odometer
- A turning angle of steering wheel sensor or compass.
The odometer readings is each time transmitted along the vehicle's ID and corresponds to the exact position of the vehicle along its course.
(2) In order to assure communication between commuters and the Operations Centre, P.P.I. are installed at the intermediary stops which communicate with the Operations Centre through the I.C.S.

4. Parking Service

For the embodiment of this service it is preferable to use a network of I.C.S. centrally connected to a central data processing system (Figure 9). The central data processing system is connected with Verification and Warning Probes (V.W.P.), that is an I.C.S. in miniature, which are installed in parking spaces of the area covered by the service. The verification and warning probes are presented in detail in the description part of the Service for the use of public transpor means.

In a second embodiment, the connection of the I.C.S. in a ring configuration is selected (Figure 12). No central processing system exists; instead inter-I.C.S. communication is used.In the second embodiment, the verification and warning probes of each parking space are connected, by one of the previously mentioned ways, to the nearest I.C.S. In this case, the user is again equipped with a P.P.I. Both the station (and the probes) and the individual devices have all the characteristics described at the beginning of the embodiment.

Particularly for this service, a second embodiment provides apart from the P.P.I. for the cooperation between the I.C.S. network, the V.W.P. and any in-vehicle routing and drivers' guidance system, as long as the said system offers the following capabilities:

- Capability for external communication with transmitter-receiver devices.
- Estimation of route to be followed by the vehicle from point A to point B.
- Detailed guidance for manoeuvring in order to reach a specific destination.

For the present embodiment, the routing and vehicle guidance system of the greek patent application No. 910100364 is foreseen.

Finally, a third embodiment, foresees use by the user of a simple "card" made of plastic, cardboard or other rigid material, as mentioned in the description of the embodiment for the Pedestrians' Information and Guidance Service (1).

The operation of the Parking Service according to the three methods mentioned above is the following:

(a) By the use of portable, personal information and communication device (first embodiment)

It is foreseen that the I.C.S. transmits an encoded message which is received by the P.P.I. and translated into an audio and visual message for the user, informing that he is able to book a parking space on the spot.

Upon notification, the user presses the P.P.I. key corresponding to parking space booking. However the following has been carried out:

(1) The user's final destination has been introduced to the memory unit.

(2) The code number of the debit account has also also been recorded in the memory unit.

(3) The time and duration of the booking may be recorded in the memory.

(4) Finally, vehicle's details are registered in the P.P.I.'s memory unit.

When the user presses the key for PARKING SPACE BOOKING, the series of encoded messages corresponding to the above registered data in the memory unit, is trasnmitted by the P.P.I. trasnmitter and is received by the receiver of the nearest I.C.S.

(b) By the use of the routing and driver guidance system (second embodiment)

Upon pressing the respective key a series of encoded messages with the above data is transmitted (see greek patent application No. 910100364).

(c) By the use of "a card" (third embodiment)

By inserting the card to the respective I.C.S. slot, the user gives the code of his/her account. Thereafter, following instructions from the I.C.S, the user keys-in the abovementioned details.

As soon as the details are inserted in one of the I.C.S. following one of the above three embodiments, the method provides for:

(1) Information relating to parking requests, are transmitted through the I.C.S. network to the Central Data Processing System, in the first described embodiment.

In the second embodiment (ring connection) the information

is transmitted to the network of stations.

(2) The parking spaces of the covered area, are connected through the V.W.P.

- either with the main network control system
- or with the nearest information station and advise on the empty spaces in the parking area.

(3) When a request for booking is received by the Central Management System which is aware of the destination, it selects the nearest parking place and checks if there is an empty space fulfilling the specifications set by the user. In case of inavailability at the nearest parking place, it immediately checks the next one etc. until it finds the place. For the case of a ring network , the I.C.S. after receiving the request from the user, relays the data to the I.C.S. covering parking places near the destination place. Any free places are made available to the nearest I.C.S.

In essence, by combining requests and existing places, the user is temporarily registered in one of the places from the management system.

(4) Following this, the place secured is transfered to the applicant following the path through the network in reverse. It is provided that:

(i) If a P.P.I. is used, the destination area is wirelessly transmitted to the driver.

- If the driver does not know the exact parking area and needs guidance towards it, he/she stops near an I.C.S. inserts his/her personal device and requests a full routing to the destination.
- A map of the area with parking areas is presented on large panels installed in various points along the entry arteries.
- If, finally, the capabilities of P.P.I. allow it, a series of instructions on how to reach the parking area is transmitted from the device in an audio and visual way.

(ii) If a vehicle routing and guidance system is being used, the system is provided directly with the location of the parking place as the final destination.

(iii) If a "card" is used, the parking place is displayed on the screen of the I.C.S.

(5) In parallel, the user is informed of the tariff pertaining to the time and duration of parking.

(6) Finally, the user confirms the booking and the said parking place is deleted from the network to avoid double bookings.

(7) In parallel, the user is informed, through the stations and the V.W.P. of the parking area, of the booking and the vehicle details, as well as the time and duration of the booking.

(8) When the booking is made, the driver drives towards the parking area and enters it. Through the V.W.P. installed in the parking area, the entry is wirelessly or manually (keyed-in) verified.

(9) When the user drives out of parking lot and passes by the V.W.P., along with the exit verification, the final charge on his/her account number is levied.

## 5. Monitoring and Guidance of Vehicle Fleet Service

The embodiment of vehicle fleet monitoring from a Operations Centre will be reported herebelow.

In a first embodiment the service offered by using the main devices of the method, will be reported. The main devices are:

- The Portable Personal Device (P.P.I.) installed in each vehicle.
- The network of Information and Communication Stations (I.C.S.) installed in the area for its uniform coverage.
- The Central Control Unit (C.C.U.) that the I.C.S.s are connected to forming a network.

### (1) Continuous Position tracking of each fleet vehicle

Following cases are observed:

(a) The in-vehicle P.P.I. transmits in fixed (timewise or distancewise) intervals the I.D. of the vehicle which is transmitted to the nearest I.C.S. and retransmitted to the C.C.U. and the Operations Centre. From the installation

location of the I.C.S., the vehicle position is estimated within the reception range of the I.C.S. receiver or respectively the transmission range of I.C.S.

(b) The Operations Centre is aware of the itinerary of each fleet vehicle. In this case and for determining the exact position, the stipulations of the SERVICE OF CONTROL OF PUBLIC TRANSPORT MEANS (3), are to apply.

(c) The vehicle is equipped with a mechanism for position location on the road network.

If the Operations Centre is aware of the exact vehicle position, eventually, on the road network, based on the position details received (e.g. every 20 sec.) it may reproduce on a numerically encoded piece of paper the course of the vehicle and its position.

In other embodiments, following are provided for the position location of a vehicle:

(d) Installation of transmitters, along the road netword, which are characterised by their particular installation position code number. Those transmitters interfere between the in-vehicle P.P.I.s of the fleet and the I.C.S.s. If they accept the vehicle's I.D. signal, they transmit it along with the position code number of each transmitter.

(e) Increase and reduction of a P.P.I transmitter range. In this embodiment, for the I.D. code number of each vehicle under surveillance, two signals are transmitted one of which has double range compared to the other. The Operations Centre, upon comparing the positions of re-transmitting I.C.S., accurately determines the vehicle position on the road network.

(2) Two-way communication of each vehicle with the Operations Centre

The stipulations of the SERVICE OF CONTROL OF PUBLIC TRANSPORT MEANS are also to apply here, i.e.:

Through P.P.I. and I.C.S., the driver of each vehicle transmits to the Operations Centre standard or free

messages. The Operations Centre transmits instructions concerning the manoeuvres that a driver has to carry out, which are distributed to the I.C.S. installed along the route of the particular vehicle. Thus, when the driver drives by the first I.C.S. he/she is informed, for example, of TURN RIGHT, STRAIGHT 150m/, by the second I.C.S. TURN LEFT, STRAIGHTFORWARD 200m, STOP and so forth.

6. Integrated System for Alarm and Immediate Coordinated Action Service, against Criminal and Terrorist Activities

In a first embodiment following are provided in order to handle criminal and terrorist activities in an area covered by the present method:

(1) The use of P.P.I. which are equipped with distress signal keys, preferably of three types, i.e.:

- [S.O.S. YELLOW key]: It transmits a distress signal which does not require priority.
- [S.O.S. ORANGE key]: It transmits a distress signal and the immediate alert of police is required.
- [S.O.S. RED key]: The immediate intervention of the police is required.

With the P.P.I. bearing above distress signal keys, following persons may be equipped:

(a) Persons residing or moving in the area of application and run high assault risk.

(b) Vehicles running high risk of criminal and terrorist activity. The in-vehicle P.P.I. is permanently istalled and each driver or passenger may eventually activate it to transmit S.O.S. signal. The activation of the in-vehicle P.P.I. for transmission of S.O.S. signal is achieved through switches installed in various spots of the vehicle or wirelessly by switches carried by the passengers.

(c) Buildings and establishments often constituting a target for criminal and terrorist action. The P.P.I. of the establishment apart from trasnmitting S.O.S. signals, also transmits the position code of the establishment.

(d) Areas with a history in criminal activities. Such areas may be squares, playgrounds, small parks, roads, neighbourhoods etc. In those areas, P.P.I. for S.O.S. signal transmission are installed that may be activated, for example, by persons passing-by in case they detect a suspect activity or an activity endangering the life or the personal valuables of other people.

In a second embodiment, the activation of P.P.I. for S.O.S. signal transmission and immediate intervention is provided and carried out automatically by the shock wave caused by firing and explosion. In this case, the activation switch is a sensor, sensitive to shock waves caused by firing and explosions, that activates the said P.P.I. worn by a person or installed in a building, vehicle or area.
As a result of the activation of a P.P.I. and S.O.S. signal transmission, the signal is received by the nearest I.C.S.(s) and is, thereafter, immediately transmitted to the Operations Centre. For the best possible tracing of the exact S.O.S. signal transmission location, following are provided:
(a) The nearest I.C.S. that re-transmits the signal towards the C.C.U. indicates the area of signal transmission.
(b) The P.P.I. transmits two signals of differet intensity. The position of I.C.S. each time re-transmitting the signal, indicates the location of transmission.
(c) If the P.P.I. transmitting an S.O.S. signal is located within a vehicle disposing of a Position Detection Device (in its basic form, the device consists of an odometer and a compass), the coordinates of the vehicle on the road network and the I.D. of the person requesting assistance are transmitted along the S.O.S. signal.
(d) Finally, when a P.P.I. is installed in establishments and areas, along with the S.O.S. signal, it transmits the coordinates of its position. Upon receipt of the S.O.S. signal and detection of the position of its transmission, the Operations Centre and C.C.U. acknowledges the distress signal upon display of the I.D. of the P.P.I. user and

verifies the S.O.S. signal requested by the Operations Centre in the reverse procedure.

In case of explosions and firings, the verification is achieved as follows: The I.C.S. disposes of a device that registers the audio information for a short time period. If a certain P.P.I. becomes activated due to firing or explosion, the Operations Centre automatically requests from the nearest I.C.S. to transmit the audio information that was registered in the last few seconds. The audio signal is amplified and analysed in the Operations Centre in order to verify if it was caused by explosion, firing or a random loud noise. A similar method of verification can be installed in guarded vehicles and buildings.

Supervision over possible targets

The Operations Centre monitors the movement of the police patrol cars. For the most important tasks, the fleet includes:

- Very fast motor bikes
- Patrol cars
- Personnel transportation vehicles
- Light-armoured vehicles

The Operations Centre, when using the FLEET MOVEMENT control service (5), is regularly updated with vehicle positions, displayed on a screen, and is able to draw its itinerary and transmit instructions. When possible targets are merely supervised, the Operations Centre carries out following:

(a) It directs the movement of vehicles in such a way that they regularly supervise and pass by possible targets.

(b) It coordinates the movement of vehicles in such a way that they support and supervise the movements of other fleets or vehicles.

(c) Finally, the fleet movement, in case of supervision, depends on the reception of YELLOW S.O.S. signal. In the event of mere supervision, following factors are taken into account:

- The traffic of the road network.

- The statistics applying on the possibility for assault to the areas under supervision.
- The fleet movement, in case of supervision, serves the purpose of deceiving eventual perpertrators and terrorists, of power demostration and of reinforcing the sense of security of the inhabitants.

Fleet Alert

In the service of alert, a vehicle is or a group of vehicles are assigned with the supervision of an area likely to be assaulted and with the constant alert to intervene if need be, as in the previous service. The said areas are those where an ORANGE S.O.S. signal was transmitted from or which, according to the statistics or other information available to the police, are suspected for assault. In this case, the vehicles proceed to the possible targets or the wider area, according to a strategic plan, aiming at:
- Blocking the evasion scheme of perpetrators.
- Demonstrating power.
- Avoiding being trapped in highly congested areas.
- Estimating the course of the possible target.

Service of immediate Intervention

This service is characterised by:
- reception of S.O.S. RED signal
- detection of firing or explosion

To handle the situation, the C.C.U. of the Operations Centre, coordinates for a few seconds the movement of fleet vehicles following predetermined tactics. Those tactics consist of:
- Information provided to other services and/or Operations Centres concerning the assault.
- Mobilisation of vehicles located nearest to the target, immediately responding to an S.O.S. call.
- Fast approach of the fleet of vehicles for the blocking of the area.

- Alert of the rest of the fleet and secondary coverage of the city areas.
- Any other information provided to the Centre.

In general, the movements of the fleet consist part of the Operations Centre planning and the result of experience gained from handling similar incidents.

Other devices supporting this service

For the support of this service, following are provided:

(1) Several monitors installed in the Operations Centre controlled by C.C.U., display - in the desired scale - the road network or parts thereof or other areas of the urban centre as well as the position, the movement of the fleet and the coordinates of S.O.S. signal transmission, in order to facilitate the coordination of the fleet movement by the experts of the Operations Centre.

(2) An automatic route guidance and position system (e.g. the "Pan-Drive" system of the Greek Patent Application No. 910100364) installed in all vehicles of the fleet, enabling the Operations Centre to send instructions to the drivers, and vice versa, as well as to inform them of the course of the vehicles, without delay.

Figure (11) schematically presents this service:

- The user realises the danger. He/She presses the S.O.S. key on the P.P.I. (116).
- The S.O.S. signal is transmitted from the P.P.I. towards the nearest I.C.S. (112), which might also be the in-vehicle transmitter of the particular user and thereafter towards the network of I.C.S. (113).
- Both the transmitters and the I.C.S. bear a code number corresponding to their exact position of installation.

7. Administration, control, communication and information Service for military forces in a greater area, providing

coordination of defensive and offensive operations

This Service is based on:
(a) the contour digital mapping of an area
(b) a method of position estimation, of vehicles, immobilised targets and infantrie and may be:
* a vehicle guidance and navigation method (Greek patent application No. 910100364)
* a tracking method consisting of an odometer, a counter of the steering wheel angle of turn and of a transmitter network
* a Portable Personal Information and Communication Device (P.P.I.) equipped by a short range transmitter-receiver
(c) a network of stations (I.C.S.) which connect the mobile and immovable targets with the Operations Centre and the C.C.U.
(d) a databank that provides input to the C.C.U. with information concerning the position, identification, handling, manoeuvres etc. in order to minimise the response time.

At a first embodiment, large monitors are installed in the Operations Centre of the General Staff, in the military operations Headquarters and wherever necessary, which display the digital map of the area of military operations, wherein the officers observe the developments and act accordingly.
For the armoured vehicles, all areas where access is easy, such as fields and forests, are digitised and registered. Following are also registered:
- safe passages through rivers etc.
- areas offering good natural camouflage
- passages through ravines or existence of uneven ground
- areas of dangerous exposure due to visibility
- acclivities or declivities and accessibility
- stability of the soil and accessibility

For the infantry, all ground formations of interest are registered, along with areas where they may walk in without

risking their lives, such as dead-ends, swamps, rivers, open fields etc. It is understood that the software provides the correct instructions concerning forward course and/or retreat, taking into account the overall strategy, prior recon-naisance and registration of the proper selections.
The display of a vehicle, a unit, troops etc. is made by a symbol and a colour representing each particular category. Moreover, the ID of a motor vehicle, the name of the eventual driver, the name of the officer of the unit may be displayed if required. In case of an assigned unit, its forces, provisions, equipment etc. may be requested.
On the screen installed in the Operations Centre, following locations are displayed:

- food storage areas
- fuel storage compartments (fixed or movable)
- ammunition dump
- high or small strategic value targets
- hospitals
- workshops
- and other necessary information

In order to determine the location of the Services of Supply, there is a continuous feedback with details concerning changes. Particularly, during warfare, there is a complete supervision of all auxiliary services.
Minefields. Registration of mine positions is easy since every geographical point is digitised. A vehicle can safely move through the minefield when guided by computer. The digitised maps that present the positions of tanks, artillery, missiles, mortars and other weapons, enable the graphical representation of the range and the fire capacity that they may cover within the enemy territory. The range of each weapon may be presented in a different colour in order to give the Officers a "panoramic" view of the field of operations.
The digital maps concerning the enemy territory are displayed on the screen of the Operations Centre, next to the ones of the friendly territory. Every information is

digitised and displayed on the map. The ascertained or possible positions of the enemy artillery are graphically presented with their firing range towards the friendly territory.

Other applications:

* Monitoring the dropping of paratroopers on friendly or enemy territories.
* Registration of the positions of army helicopters.
* Full observation of the islands and a fully prepared scheme of operations for each one, depending on the volume and category of available forces.
* In case of fire, the location of fire, the positions and size of forces summoned for fire fighting.
* Posterior evaluation of operations and assignment of responsibilities.
* Dry runs.

8. Service for the protection of vehicles against robbery or theft

According to a first embodiment

(a) the installation on each of the above objects of a P.P.I. which in the present service transmits:
- an encoded signal declaring theft,
- the identity of the object in encoded form
- any other encoded element considered to be necessary by the owner for its protection.

The said P.P.I. is installed in the vehicle, on board a ship or an object to guard, in a position where it is not easily located. This service for the operation of the P.P.I. provides:
- a keyboard
- a microprocessor
- a transmitter

From the said components, the transmitter requires special protection. Moreover, the vehicle for the purposes of this

service is equipped with:

- a sensor (for monitoring the change of interior air pressure, for vibrations, for acceleration etc.) which detects possible changes in the operation or the position of the vehicle, boat or object.

If the position, speed or condition of the vehicle, boat or object changes, the theft signal transmitter is automatically activated. The trasnmission of the theft signal starts a few minutes after its activation. In the meantime, the signal may be cancelled only if a certain code number is keyed-in.

The power supply of the transmitter, during its operation, does not depend on the electric circuit of the vehicle or boat or object.

(b) The I.C.S. connection with the C.C.U. and the Operations Centre. The Operations Centre, may be the office of a private service which has undertaken to supervise and protect the insured objects. It disposes of a fleet of high speed vehicles that it guides and controls (see the service of fleet traffic control [5]) for supervision of robbery targets, perpetrators pursuit and recovery of stolen items.

(c) The activities of the Operations Centre and of the security and surveillance fleet are analogous to those of the Alarm Service (6). Indicatively, these activities are briefly presented below:

(1) Simple supervision of the guarded vehicles, boats, objects.

(2) The memory unit of the C.C.U. in the Operations Centre is loaded with full details on every covered and protected object. Thus, if it receives the identity of the object along with the signal of its theft, the file containing full data is automatically retrieved from its memory and they are transmitted to the surveying vehicles.

Another embodiment foresees the automatic transmission by the C.C.U. through the I.C.S. network to the pursuing vehicles of images (e.g. digital video technology) which display the stolen vehicle or object facilitating its

surveillance.

(3) Surveillance of a stolen vehicle upon receipt of the theft signal.

In this embodiment, the Operations Centre controls the position and course of the vehicles from a number of monitors displaying the unfolding of the operation. Each time, details (and/or images) of the object are retrieved from the memory of the C.C.U. whilst the signal of the object is received and the course of the nearest surveillance vehicle is automatically displayed on the monitor for the tracing of the suspects.

9. Alarm and Building Protection Service

This service aims at building safe-guarding and protection. This service is similar to "Alarm and Action Coordination Service in case of criminal and terroristic acts (6), but its main scope is building safe-guarding and protection. In relation with:

- Tresspassing from non-authorised personnel
- Fire
- Malfunction

By owners' demand, this protection could also cover special cases referring to some special characteristics of the building under protection, i.e.:

- Protection against rise of temperature in cold storage warehouses.
- Protection against irregular humidity variations.
- Protection against short-circuit effects.
- Protection against liquid or gas leakages.

In a first embodiment following are provided:

(a) Each area under protection is equipped with a number of suitable sensors, such as:

- Radar systems for human movement detection.
- Temperature sensors.
- $CO_2$ or smoke detectors.

- Humidity sensors.
- Short-circuit relays.

(b) Each building under protection is also equipped with a P.P.I. which transmits a code when actuated. The transmitted code consists of:

- A code indicating the problem.
- Building coordinates in encoded form or building code number.

(c) The transmitted signal is captured by the nearest I.C.S. and transmitted to the Operations Centre and C.C.U. The Operations Centre, which could be a private company, also possess a fleet of high speed vehicles which are controlled using the Fleet Control and Guidance Service(s). In the C.C.U. memory unit all necessary data with reference to the buildings under protection are stored. Data are composed of:

- Technical features of all sensors
- Area or building layouts

(d) Upon receipt of the signal from the protected building, a problem identification and handling mechanism is set on. At the same time, the C.C.U. automatically processes the possible deterioration of the problem, its origin, scenarios for confronting it and in many cases it gives instructions for better handling the situation. Indicative scenarios are:

- Possible way followed by a suspect person to access the building. Possible exit or escape point and approach plan of security forces in order to block the person's evasion.
- Possible cause of fire, fire spreading probability and ways to approach and extinguish it in order to avoid extensive damage.
- Possible origin of short-circuit and its handling.

(e) Thereafter, the fleet vehicles are mobilised in order to handle the situation.

<u>Automatic Distress Call of the Appropriate Agency for Emergency Situations, providing Coordination and Guidance.</u>

as well as Position, Tracking and First Aid Services.

This service is offered to individuals who desire or need special treatment, such as:

- Individuals with some kind of a health problem and which might need at some instant immediate action from a medical service.
- Individuals which desire personal surveillance and protection during their transportation within the area of application.

An embodiment of the service is the following:

The individual who desires use of this service is supplied with a P.P.I. which, depending on the circumstances and by depression of the corresponding buttons transmits one or more numeric codes. Each P.P.I. key serves a different purpose, i.e.:

- S.O.S
- Medical Assistance
- Warning, etc.

Moreover a single identity key contains grades which characterise the urgency of the situation. Such grades are:

- The existence of three keys indicating the seriousness of the situation.
- By pressing once a single identity key simply declares that some problem exists while consecutive depressions of the same key signify the emergency and need for assistance.

In every case, depression of a key causes the corresponding code to be transmitted from the person's P.P.I. to the nearest I.C.S. where it is prioritised according to the urgency of the signal. Finally, the code reaches the Operations Centre and the C.P.U. via the I.C.S. network where the signal is decoded and used to retrieve from the data processing system's memory the recorded information which refer to that code.

This information is recorded according to the desires of the individual who will use this service and are, in a first

embodiment:

(1) Personal data of the individual

(2) Individual's photograph, finger prints etc.

(3) Special characteristics of the individual

In this embodiment the C.C.U. notifies automatically the medical centre or the consulting doctor about the identity of the patient. In addition however, it makes available to the medical centre the details of the ICS of the area in which the signal is received so that the location of the individual requesting assistance can be pinpointed.

In all the above situations:

- The C.C.U. identifies the position from which the code was transmitted. Position identification is done using one of the abovementioned methods, namely:

* location of the nearest I.C.S. which received the encoded signal.

* emission of two signals of differing power levels from the P.P.I. and comparison of the positions of the corresponding I.C.S. which relay the encoded signal.

- The C.C.U. presents the Operations Centre with the details of the individual requesting assistance as well as the nature of the assistance requested.

- The C.C.U. notifies (automatically or via the Operations Centre) the service or the individual whose assistance is requested by the user. Notification is carried out by following a reverse path through the I.C.S. or via the telephone service or via a special/dedicated network in order to cover all contigencies as, for example, by a direct connection with the tourist police HQs.

- Finally, the C.C.U. communicates with the user immediately after it receives the signal, and by following a reverse path through the I.C.S. network to the area where the user was located, it confirms to him by audio signals or visually through the P.P.I. that the request is being processed and advises him to wait for assistance.

In a second embodiment, the following are foreseen:
Activation of the P.P.I. and transmission of the encoded distress signal is done automatically using the following mechanisms:

- Coupling of the P.P.I. with a sensor monitoring the user's heart rate.
- Coupling of the P.P.I. with an accelerometer measuring possible vibrations during the individual's locomotion.
- Coupling of the P.P.I. with a sound sensor. In case of an explosion, firing etc. the corresponding signal is emitted.
- If the C.C.U. receives the signal from some P.P.I. (following a reverse path), it activates the nearest I.C.S. so that it emits a high intensity audio signal to passers by and induce them at providing assistance to the said individual.

11. Traffic regulation in cases of traffic congestion Service

In order to be able to address the traffic congestion problem, one must follow one of the following procedures:
(a) Detection of streets which are showing increased traffic.
(b) Divergence of traffic flow in order to avoid bottlenecks in the main traffic arteries.

For the implementation of the method it is necessary that a large number of vehicles are equipped (as a first embodiment) with a P.P.I., and as a second embodiment with a simple transmitter sending a simple encoded signal which is common for all the vehicles. Both the P.P.I. and the transmitter send the same encoded signal at regular intervals which are common for all the vehicles, for example every 10 seconds precicely. The vehicles passing near the network of I.C.S.s send the encoded signal via the I.C.S.s to the Operations Centre and the C.C.U.
Each I.C.S. records and transmits all the signals received within the 10 second interval from the vehicles passing by

and also stores in the memory unit of the I.C.S. the exact time each signal was received. It then compares these times with the ones from the following 10 second interval. All received signals which correspond to the same instant of the regular interval, correspond also to the vehicles which are located within the area covered by the I.C.S. for the duration of the two samplings. The signals which do not match up in the two samplings correspond to vehicles that entered (or left) the surveilled area during the two samplings.

Thus for example, if there is a one to one correspondence between the encoded signals received during the two samplings, it can be concluded that the vehicles are completely immobilised. If again there is no correspondence, or only what is foreseen statistically, then it can be deduced that the traffic is free-flowing.

The length of the time interval for receiving and transmitting the common signal is selected in such a way that it is possible to draw positive conclusions under normal conditions and speeds, which occur in urban centres. The length of this interval (e.g. the abovementioned 10secs) is derived both from the observed vehicle speeds and the density of the I.C.S.s within the covered area.

By identifying corresponding signal receptions during the two successive samplings it is possible to derive the speed of the vehicles passing by, if this has a value between zero (immobilised vehicles) and that of free - flowing traffic.

Identification of the road from which a given I.C.S. monitors the vehicles passing by can be achieved in a number of ways such as:

- coverage of the urban road network with a network of I.C.S.s.
- use, in every I.C.S., of a directional antenna which corresponds to a single road.
- indirect identification of the road by comparing the signals which are received from I.C.S.s which are at close proximity to a specific part of the road.
- transmission by each vehicle of the common signal code at

two different power levels, low and high.

Each I.C.S. relays at regular intervals the traffic situation to the Operations Centre, where after processing by the C.C.U. this situation is recorded on a map of the road network of the urban centre.

If the road map of the urban centre is saved in the memory of the C.C.U., the traffic information for the road network is ready for processing by the C.C.U. and the required actions for resolving the critical situations can be dictated automatically by the C.C.U.

In order to regulate the congestion problem, the present service foresees the following:

(1) Dissuade the driver from using his vehicle during rush hours and in general during hours of increased traffic.

The I.C.S. network transmits an encoded signal depending on the loading of the road network in such a way that its reception from the P.P.I. corresponds to a message to the driver to use public transportation means during rush hours or to avoid using his own vehicle.

(2) Regulation of the traffic lights from the I.C.S. network according to the traffic loading. The nearest I.C.S. undertakes the task of changing the timing of the traffic lights, according to instructions it receives from the C.C.U. of the Operations Centre.

(3) Priority use of the road network.

This is a future service according to which the encoded signal transmitted by each vehicle corresponds to its assigned priority regarding the use of the road network or a part thereof. A number of priorities is foreseen, each priority corresponding to a different code.

Depending on the loading of the road network the I.C.S.s transmit information to vehicles whose priority allows them to circulate in corresponding parts of the road network. Low priority vehicles are informed about the possible times for use of the road network. If an I.C.S. which controlls a part of a road receives a signal corresponding to a priority which is not allowed, it automatically informs via the

C.C.U. the road network security service so that it apprehends the violator.

(4) Regulation of the traffic is combined with the fleet management service. The vehicles circulate in a manner which very slightly encumbers the loading of road arteries during rush hours. For fleet management of similar vehicles they are referred to the corresponding service.

12. Service of Automatic Call and Tracking of Hired Vehicles (taxis)

The user equipped with a P.P.I. informs via the I.C.S. the Operations Centre about his/her position and requests taxi services. The C.C.U., through the service of control of vehicle fleets [5], informs the nearest available vehicle and serves the applicant. The applicant may transmit from the P.P.I. his/her destination or position to be later on (e.g. two hours later). The Operations Centre and C.C.U. inform the nearest vehicle and determine the course to be followed in order to reach the user. They estimate the duration of trip taking into account the traffic congestion at the particular time and guide the taxi.

Additionally, they guide the fleet of taxis in such a way that they are always in a territory to better serve the customers e.g. near the city centre at the end of working hours, near football grounds, theaters etc. (refer to the service of Vehicle Fleets Movement Control [5]).

Finally each taxi driver may request from the C.C.U. to provide alternative courses to the specific destination, instructions on courses to follow or the location of a destination, may communicate through the in-vehicle P.P.I. with the P.P.I. of nearby users if they transmit at the time the taxi is passing by their destinations, selecting the customers to be served. It is also noted that the present service may be combined with any of the services of the present method, wherein transfer of an individual in case of emergency or accident etc. is necessary.

13. Surveillance and Information Service concerning the existence of ice, fog, strong winds or water along a road network segment and Atmospheric Pollution Control

In this service, I.C.S.s are linked wirelessly or with wired connections with detection sensors for:

* water on the road surface
* strong winds
* fog
* snow
* air pollutants

If the sensors identify excess readings, the I.C.S. is automatically activated and transmits a message to the Operations Centre and the C.C.U. concerning the condition of the road surface and area under control. Thereafter, through the I.C.S. network, the drivers are informed about the road surface condition in various spots, in order to avoid them.

## CLAIMS

1. Integrated method of guidance, control, information, protection, communication and procedural processing, mainly suited for people, vehicles and buildings of urban centers as well as greater areas. The invention refers to a combined method of wire & wireless 2-way continuous communication between people, vehicles and equipment, that is applicable to urban centers and greater areas, seeking to satisfy requirements and supply services towards the residents of the application area, mainly providing:

a. Information and guidance of pedestrians, while walking in the areas of application.

b. Information, guidance and processing of boarding, disembarkaton and booking for public transport services.

c. Control and guidance from an Operations centre for public transport services.

d. Information for finding parking spaces, guidance and processing of the parking procedure, in the parking lots.

e. Control and guidance from an Operations centre for coordination, safety and effective movement of fleets (fleet management) consisting of groups of vehicles (ie. police, delivery, ambulance, fire trucks etc.).

f. Integrated system for alarm and immediate coordinated action, caused by criminal or terrorist activity.

g. Administration, control, communication and information system for military forces in a greater area, providing coordination of defensive and offensive operations.

h. Protection and tracking of stolen vehicles.

i. Alarm and building protection system (houses, offices, factories etc.).

j. Automatic distress call of the appropriate agency and simultaneous presentation of a person's ID, for emergency situations, providing coordination and guidance for position tracking and first aid (ie. distress call due to health problem, fire, breakdown etc.).

k. Traffic regulation in cases of traffic congestion.

l. Automatic call and tracking of hired vehicles (taxis).

m. Surveillance of the road network of a greater area, and information of drivers for ice on the pavement, flood, fog, or gust along a road segmnent, or an atmospheric pollution incident.

The method is unified (ie. supports a number of applications without the need to adjust it to the specific application) and integrated (ie. fits with the existing layout of the area or buildings, providing complete coverage of the service), with the following characteristics :

(a). Coverage of the predetermined urban center, city or greater area with a large number of INFORMATION and COMMUNICATION STATIONS (figure 1), each consisting of a central processing unit, memory unit, input/output units, transmitter and receiver, where the stations constitute a network with a CENTRAL CONTROL UNIT and DATA PROCESSING UNIT, where the stations transmit data and are controlled.

(b). Supply of the people, vehicles and buildings or areas that the method covers with a PORTABLE, PERSONAL, INFORMATION and COMMUNICATION DEVICE (figure 2), which communicates, either by wire or wirelessly with the said STATIONS, in such a way that people, vehicles, buildings and areas are able to communicate, inform, require service or assistance, through the PORTABLE PERSONAL INFORMATION AND COMMUNICATION DEVICE, and then through the installed STATIONS from the CENTRAL CONTROL AND DATA PROCESSING UNIT, which in turn informs and activates people, vehicles and services, responding accordingly depending on the specific case.

(c). Digitization of the mapped area of application, insertion of selected information in the data base of and positioning of moving or non-moving targets on the map.

The network of the INFORMATION CENTERS and COMMUNICATION, or the CENTRAL CONTROL UNITS and the PERSONAL INFORMATION UNITS constitute a kind of a "neural network of the city", emerging from a variety of services and needs which are a result of the variety of applications and information, that are directed from people, vehicles, areas or buildings, towards the CENTRAL CONTROL UNIT (ie. requests for help,

transportation, information, notification etc.) and from them, the corresponding notification, information, guidance, control etc. where is routed to the appropriate people, vehicles, services, depending on the specific case.

2. Method as in Claim 1, where the Information and Communication Stations (I.C.S.) are installed in the area of application of the method in such a way that a signal transmission from a Portable Personal Information and Communication Device (P.P.I.) is received from at least one I.C.S irrespective of the position of the P.P.I. within the above area.

3. Method as in Claim 1, where the I.C.S.s are connected to a network using dedicated telephone lines with at least one operations centre equipped with a central data processing and control unit (C.C.U.).

4. Method as in Claim 1, where each I.C.S. includes the following for the support of the maximum number of services:

- V.D.U. for the display of visual information
- keyboard for data entry
- loudspeaker for supplying audio information
- printing unit
- terminal connection for linking with the P.P.I.
- protective covers for the V.D.U and the loudspeaker

Its operational part includes:

- data and information processing unit
- memory unit with associated database
- unit and wiring for communication with the operations centre and the C.C.U.
- transmitter and receiver unit for communication with the P.P.I.s which are within range
- a unit for linking the device with the terminals which receive and supply the visual and audio information mentioned above.

5. Method as in Claim 1, where the personal portable or installed information and communication device consists of the following main parts for the implementation of a largest number of the services offered by the method:

- V.D.U for displaying alphanumeric characters, figures,

diagrams etc.
- keyboard
- loudspeaker for audio information
- touch sensitive device for tactile data entry (Greek Patent Application # 910100339)
- terminal for serial or wired connection with the I.P.C.s
- Receiver/transmitter for wireless exchange of data with the I.P.C.s

Its operational parts include:
- central unit for data processing
- memory unit

6. Method as in Claim 1, where the C.C.U. includes at least the following:
- a number of V.D.Us for visual display of data, maps, diagrams, figures etc.
- data entry devices (keyboards, scanners, OCRs, disk drivers etc.)
- loudspeaker for audio information delivery

Its operational part includes the following:
- central data processing unit
- data entry and retrieval unit connected with the I.C.Ss
- memory unit

7. A method like the one of Claim 1, wherein the information and personal guidance service for the displacement of pedestrians in the area covered by the method, is achieved through the wired link of the pedestrian's P.P.I. with the closest I.C.S. (for charging, accreditation etc. of the user) and subsequently use of the keyboard, the display, the loudspeaker and the printer unit of the I.C.S. by the user for questioning and provision of information which is registered in the memory unit of the I.C.S. and in the memory unit of the C.C.U.

8. Method, as in Claim 1, wherein for the service of information, guidance and processing of procedures for use of public transportation means, the user utilises his/her P.P.I. connected with the nearest I.C.S. for:
- information and guidance concerning the bus line or a combination of bus lines to be used for transfer from one

location to the other,

- charge registered in the memory unit of the P.P.I. and of the C.C.U. for the cost of tickets,

- registration of the bus line for the desired trip, in the passengers list.

9. Service for information, guidance and processing of procedures to be used by the public transportation means as in Claim 8, wherein in every vehicle of public transport of the area of application, a P.P.I. of limited capacity is installed and automatically connected with the network of the other I.C.S. of the method, it is fed with the commuter details and automatically communicates with the P.P.I. of the commuters, thus verifying their boarding and informing each one of his/her disembarkation stop.

10. Service for information, guidance and processing of procedures to be used by the public transportation means as in Claim 8, wherein there is the capability for communication between Operations Centre and vehicles, by transmitting messages concerning a new trip and commuter tickets entitled to board/disembark, wherein the messages may be stored in the memory unit of the I.C.S. and be transmitted when the vehicle approaches the station.

11. Method, as in Claim 1, wherein the service of control and guidance from the Operations Centre of the public transportation means, is achieved by the installation of a P.P.I. of low capacity, in each vehicle, which transmits an encoded signal towards the I.C.S. connected in a network, identifying the vehicle, whilst through the network of I.C.S., the C.C.U. is continuously updated about the position of each fleet vehicle , and thereafter in a reverse course, it transmits a message through the nearest to the vehicle I.C.S.,, for its next movement, which message is wirelessly transmitted to the in-vehicle P.P.I.

12. Service of control and guidance of public transportation means as in Claim 11, wherein small or significant changes to the itineraries of the vehicles are possible, depending on the occasional needs, so that two different itineraries complement each another, two vehicles may simultaneously

arrive to exchange commuters and avoid obstacles, and the commuters may be informed, by on-line connection, of the arrival time and changes by inserting the P.P.I. to the I.C.S. slot.

13. Method, as in Claim 1, wherein the service of control and guidance of same kind of vehicles is achieved by installing P.P.I., which trasnmits to the network of I.C.S. the I.D. of each fleet vehicle, where from the network the position is transmitted to the C.C.U. and the Operations Centre, thereafter, in the reverse procedure, the encoded messages are transmitted by the Operations Centre and the C.C.U. through the network of I.C.S. to each vehicle of the fleet under management (paging).

14. Method, as in Claim 1, wherein for the purposes of the of vehicles' or pedestrians' control and guidance, service, the vehicle position is determined by the position of I.C.S. that transmitted the signal to the Operations Centre and the C.C.U.

15. Method, as in Claim 1, wherein for the vehicles' or pedestrians' control, the position of the vehicle or the pedestrian is determined by the transmission from the P.P.I. of at least two successive encoded signals, of different intensity and therefore different range, and comparison of the I.C.S. positions which, during the successive transmissions, have re-trasnmitted the encoded signal to the Control Centre and C.C.U.

16. Method as in Claim 1, wherein for the vehicle control and guidance service a two way signal transmission in coded form is foreseen, from the vehicle P.P.I. via the I.C.S. network, to the Operations centre and the, and from the C.C.U. via the I.C.S. network to the P.P.I., where the coding foresees the message or transmission standardisation.

17. Method as in Claim 1, wherein for vehicle or pedestrian control and guidance, each I.C.S. is equipped with more than one reception antenna and comparing the reception time of the signal which is transmitted by the P.P.I. for each antenna, the direction with respect to the transmission I.C.S., whereas the comparison of reception direction of two

I.C.S. confirms the transmission position of the P.P.I.

**18.** Service of control and guidance of a fleet of same kind of vehicles, as in Claim 14, wherein the Operations Centre:

- continuously supervises the exact position of vehicles of the fleet by methods according to Claims 14, 15 and 17,
- it coordinates their movement with two-way exchange of messages according to Claim 16,
- it changes the course and re-routes in motion one or more vehicles in motion, taking into account the traffic of the road network.
- it coordinates the movement of vehicles of different fleets to achieve the optimum result,
- it coordinates the movement of a fleet of vehicles according to a plan so as to achieve a particular task.

**19.** Method as in Claim 1, wherein for the service of information, guidance and processing of parking procedure, the driver informs via the in-vehicle P.P.I. and I.C.S. the Operations Centre and the C.C.U. about his/her destination and requests a parking space at the nearest parking lot, on a certain date and thereafter the Operations Centre through the I.C.S. network communicates with the parking lot systems and registers the request and finally through the I.C.S. the Centre informs the driver of the registration.

**20.** Service as in Claim 19, wherein the Operations Centre and the C.C.U. transmit through the I.C.S. network a series of codes to the in-vehicle P.P.I. which corresponds to the itinerary to be followed.

**21.** Service as in Claim 19, wherein for the communication between the driver and the Operations Center/C.C.U., a simple card with the user's I.D. code is used, which is inserted in the I.C.S. and requests a parking space, then after the completion of the registration procedure the driver is informed of the registration through the I.C.S. peripherals.

**22.** Method as in Claim 1, wherein for the service of alarm and immediate coordinated action, due to criminal or

terrorist activity, the victim (person or vehicle) activates the P.P.I. alarm signal, which is transmitted, through the I.C.S. network, to the Operations Centre and the C.C.U., and then the Operations Centre coordinates and guides an task force consisting of emergency vehicles for surrounding of the area where the alarm was transmitted from.

23. Service as in Claim 22, wherein for the case of shooting or explosion, an automatically, sensor activated alarm is transmitted by the nearest P.P.I. to the nearest I.C.S., and simultaneously, a recording of the sound of the explosion is transmitted to the Operations Centre for determination of the source of explosion.

24. Method as in Claim 1, wherein for protection and tracking of vehicles, yachts, loads etc. against theft, a P.P.I. is installed at said objects, which transmits an ID and a signal indicating theft upon a simple relocation of said objects. Said signals are relayed through the I.C.S. network to the C.C.U. and completely describe the object, where the tracking of the stolen object is done by one of the methods described in Claims 14, 15 and 17.

25. Method as in Claim 1, wherein for the alarm and building protection service, in each building a P.P.I. is installed for transmission of an alarm signal in case of hazard, where said alarm signal is relayed through the nearest I.C.S. to the C.C.U., where it is corresponded to the full details (i.e. topographic, administrative procedural) of said building, providing information concerning and means of access, thereafter the Operations Centre mobilises via the I.C.S. network a fleet of vehicles or personnel assigned to deal with the situation.

26. Sesrvice, as in Claim 25, wherein some temperature sensors are placed in certain positions within forrested areas and in case of fire each one transmits, via the I.C.S., an identity and location number to the Operations Centre.

27. Service as in Claim 1, wherein the loading of the traffic network is monitored by an Operation Centre through encoded signals transmitted by the I.C.S., which correspond

to indications of installed sensors for traffic monitoring.

28. Service as in Claim 1, wherein the traffic load is monitored by the Operations Centre, through encoded signals transmitted by the I.C.S. to the Centre, which signals correspond to the number of signals transmitted by vehicles in motion at regular intervals.

29. Service as in Claim 1, wherein for management of traffic, guidance and information concerning the traffic load as well as strategies for avoiding traffic, are transmitted by the Operation Centre to the drivers through the I.C.S. and the P.P.I.s of each vehicle.

30. Method, as in Claim 1, wherein for the message exchange service , between drivers or pedestrians, the originator of the message transmits through the P.P.I. a code with details of the recipient and the message, which is registered in the C.C.U. memory unit, thereafter the C.C.U. identifies the recipient's identity code, from the archived data, and through the I.C.S. network informs him/her of the message recorded in the memory unit, whilst following a reverse course a message is transmitted by the recipient to the sender.

31. Method, as in Claim 1, wherein for the service of automatic call and control of for hire vehicles (taxis), the prospective user informs the Operations Centre, through the P.P.I., about his/her position and destination, thereafter the Operations Centre through the fleet management service, in order to adjust the taxi's route and to better serve the user.

32. Service, as in Claim 31, wherein the Operations Centre regulates the movement of the fleet of taxis in order to achieve the fastest transfer of a passenger from a point A to a point B, possibly using several taxis.

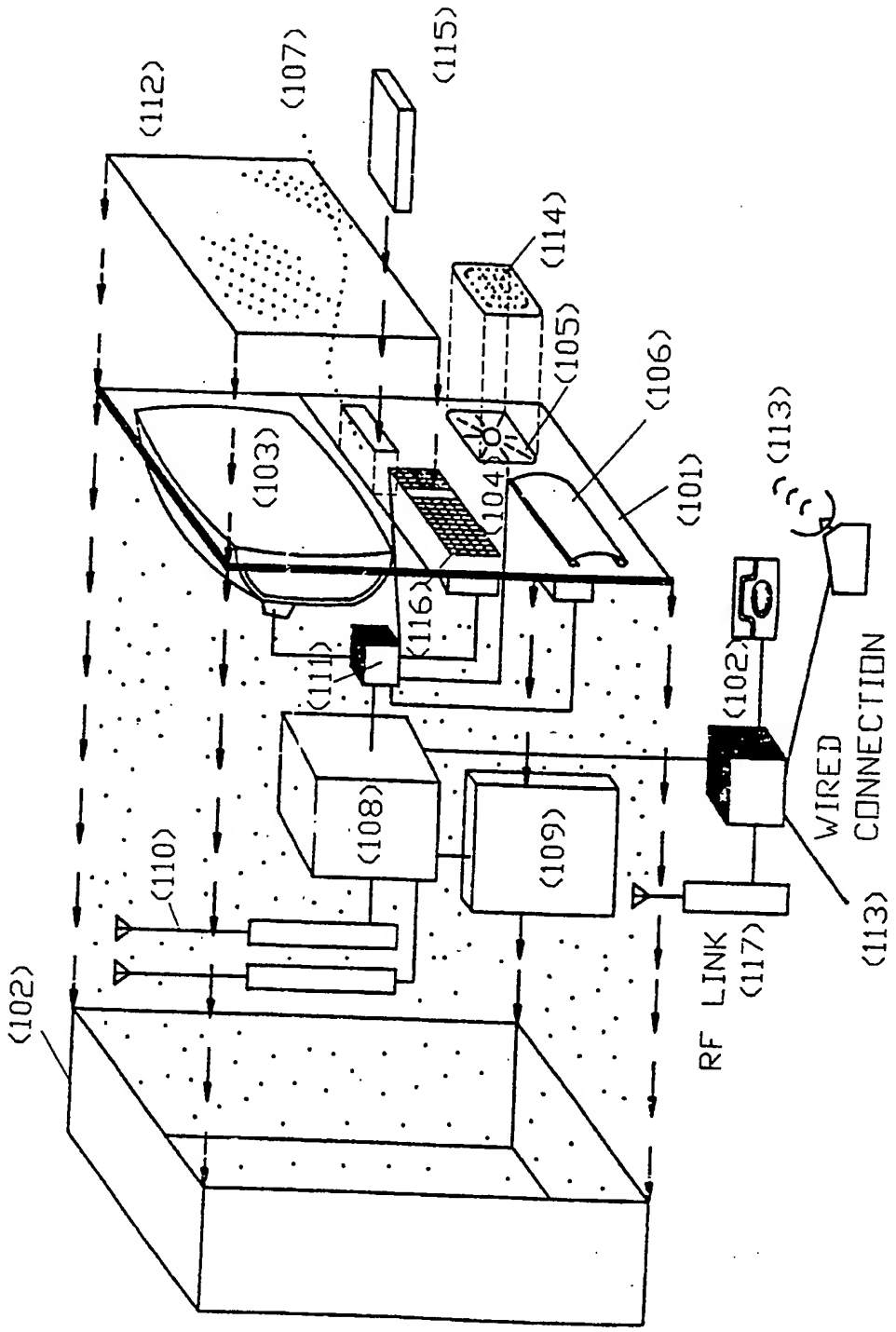
33. Service, as in Claim 31, wherein the Operations Centre plans the itinerary to be followed by each taxi and estimates its cost and thereafter transmits the details to the user and the taxi driver.

34. Method, as in Claim 1, wherein sensors for the detection of ice, fog, water, wind and air pollution prevailing in

parts of the road network, transmit encoded signals, through the I.C.S. network to the Operations Centre and the C.C.U. for the information and protection of citizens and local drivers.

35. Method, as in Claim 1, wherein its users are provided with the capability for on-line information, remote seat reservation and guidance to book hotels, theaters, restaurants, sports events, happenings and other places of interest.

36. Method, as in Claim 1, wherein the military arrangement of the friendly and enemy forces is displayed on a screen of the Operations Centre where the area which each assigned military unit covers, is displayed, whilst positions of vehicles, artillery, tanks, immovable targets and infantry are estimated using one of the methods described in Claims 14, 15, and 17.


(112)
(107)
(115)
(114)
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(106)
(113)
(103)
104
(101)
(116)
(111)
(102)
WIRED
CONNECTION
(108)
(109)
(110)
(102)
RF LINK
(117)
(113)

FIGURE 1

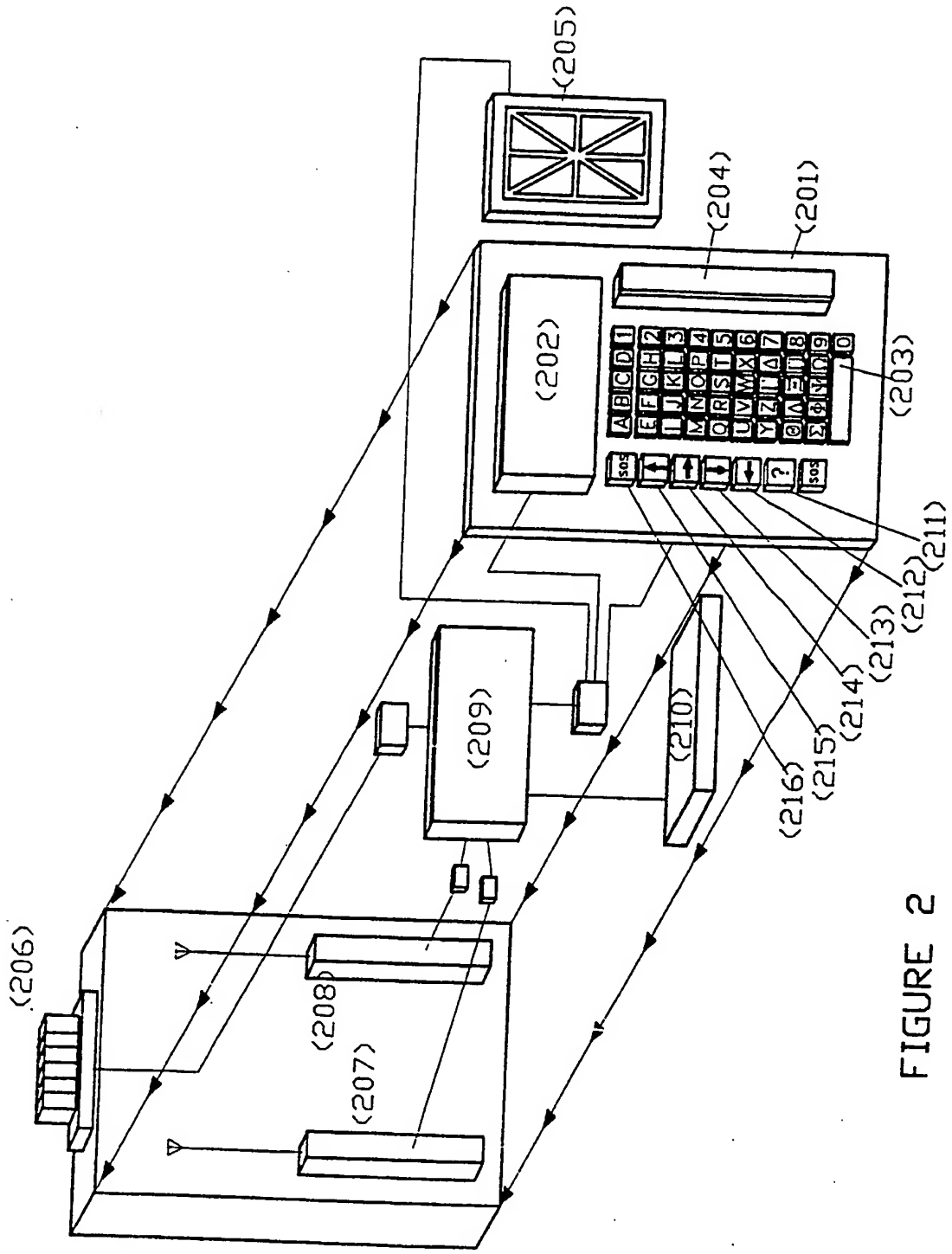



FIGURE 2

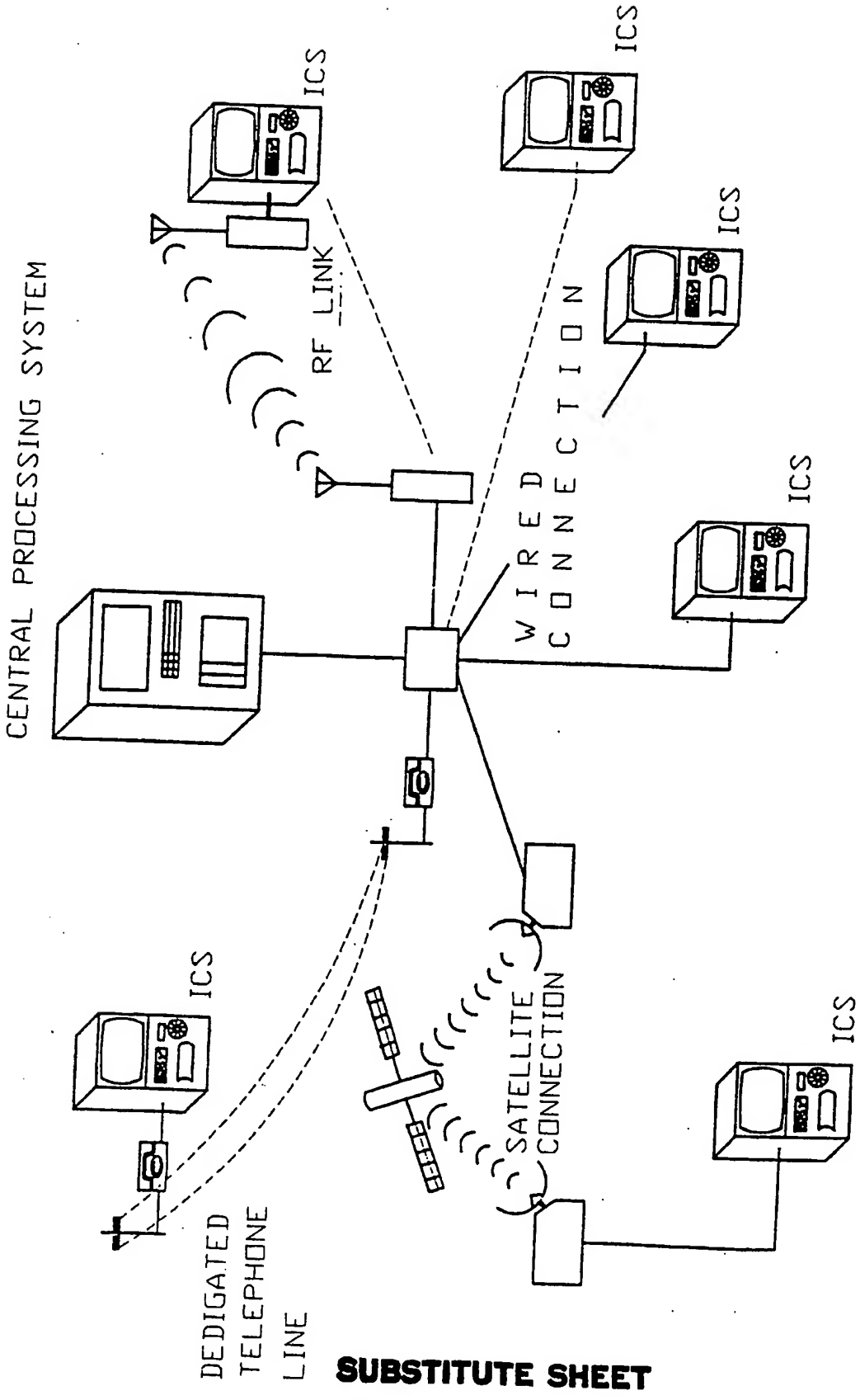

CENTRAL PROCESSING SYSTEM
RF LINK
WIRED CONNECTION
SATELLITE CONNECTION
DEDIGATED TELEPHONE LINE
ICS
ICS
ICS
ICS
ICS

FIGURE 3

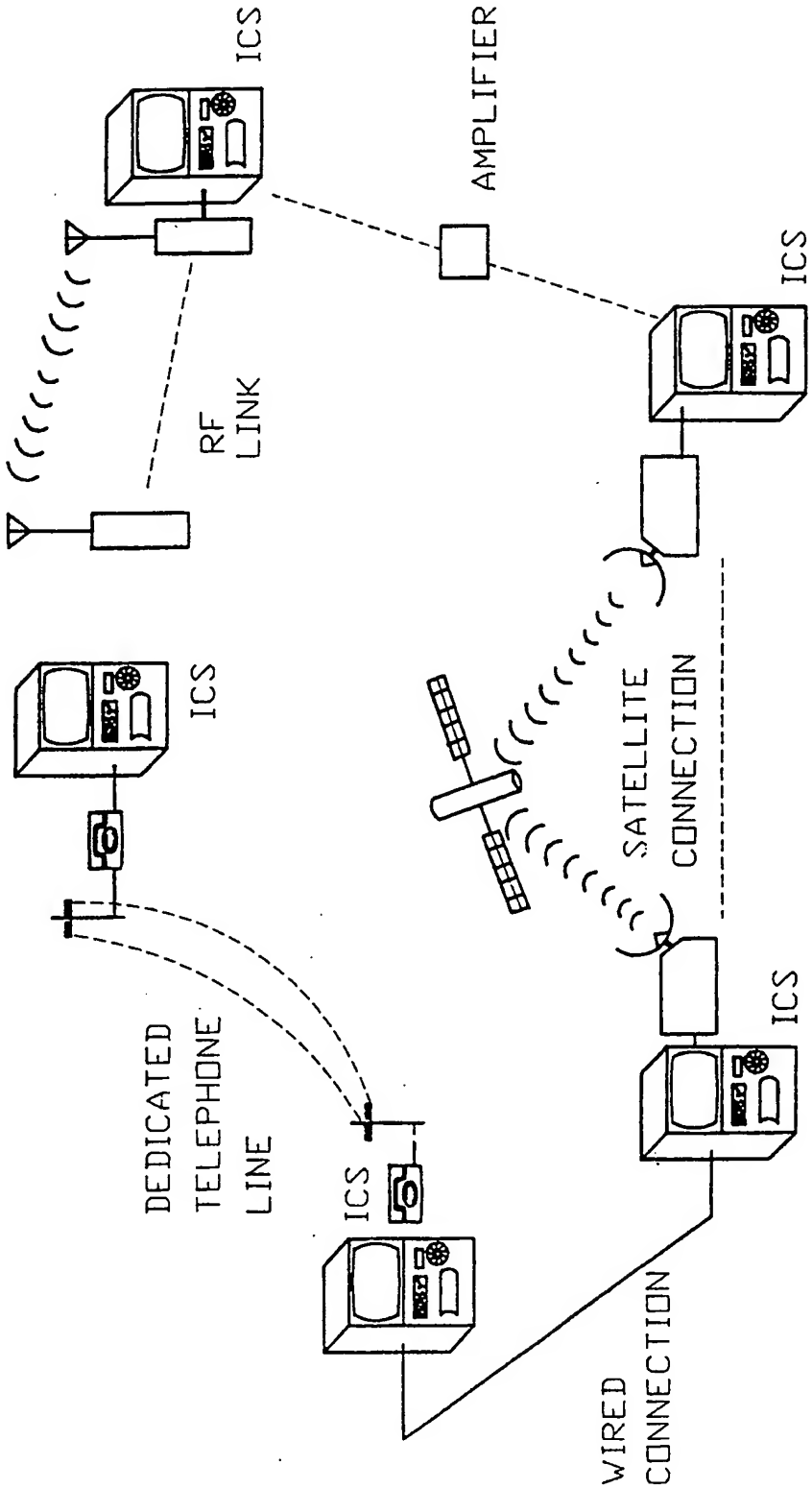

ICS
AMPLIFIER
ICS
RF
LINK
ICS
SATELLITE
CONNECTION
ICS
DEDICATED
TELEPHONE
LINE
ICS
WIRED
CONNECTION

FIGURE 4

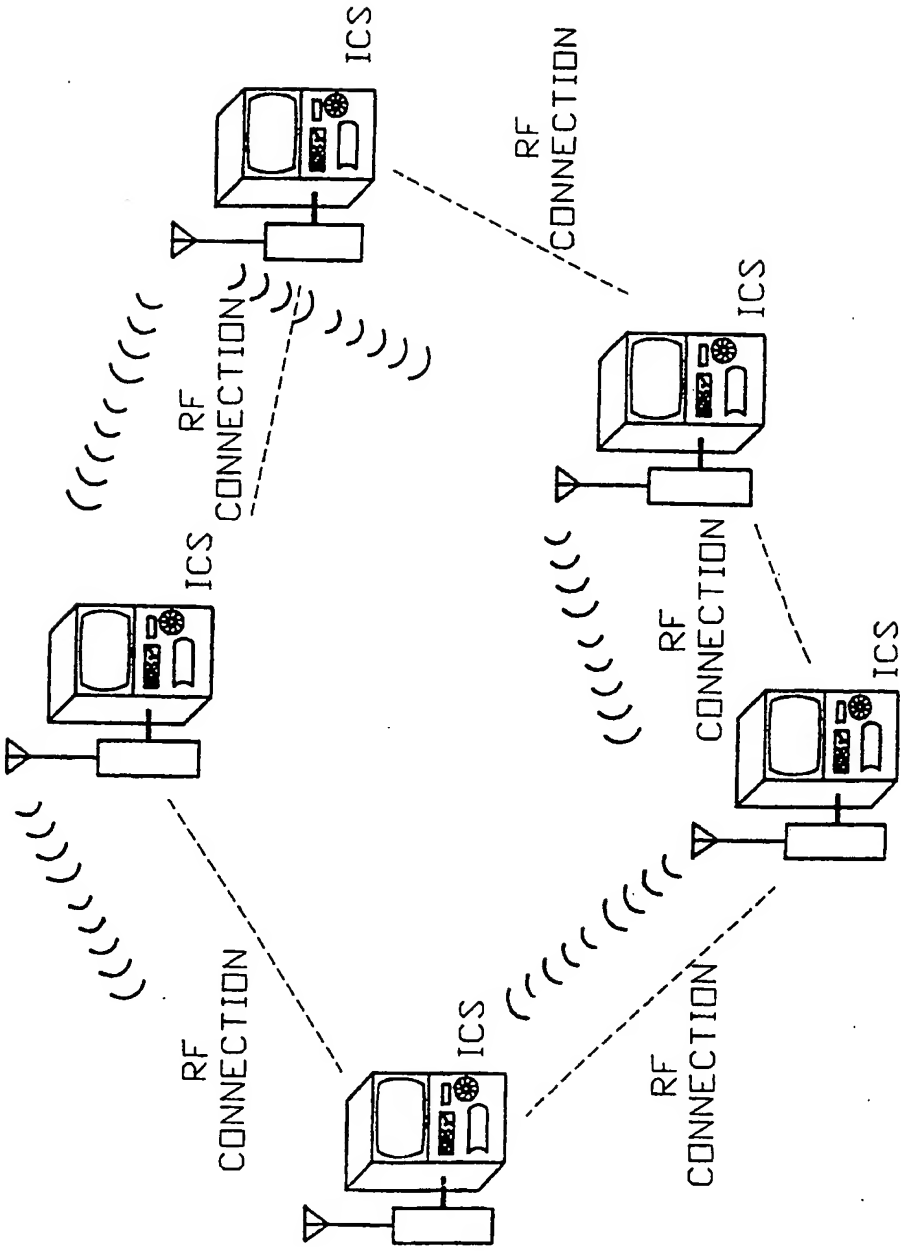

ICS
RF CONNECTION
ICS
RF CONNECTION
ICS
RF CONNECTION
ICS
RF CONNECTION
ICS
RF CONNECTION

FIGURE 5

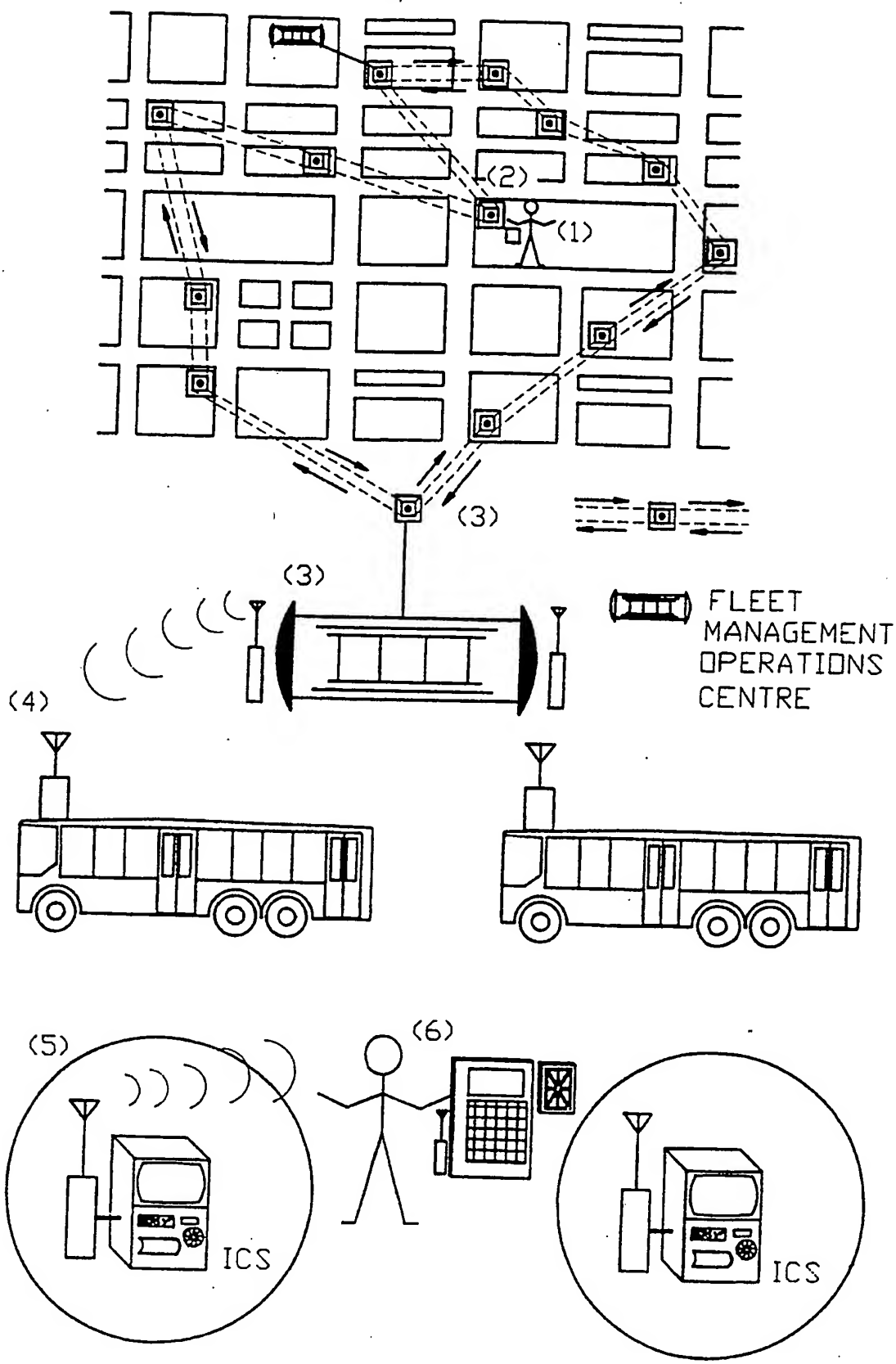



FIGURE 6

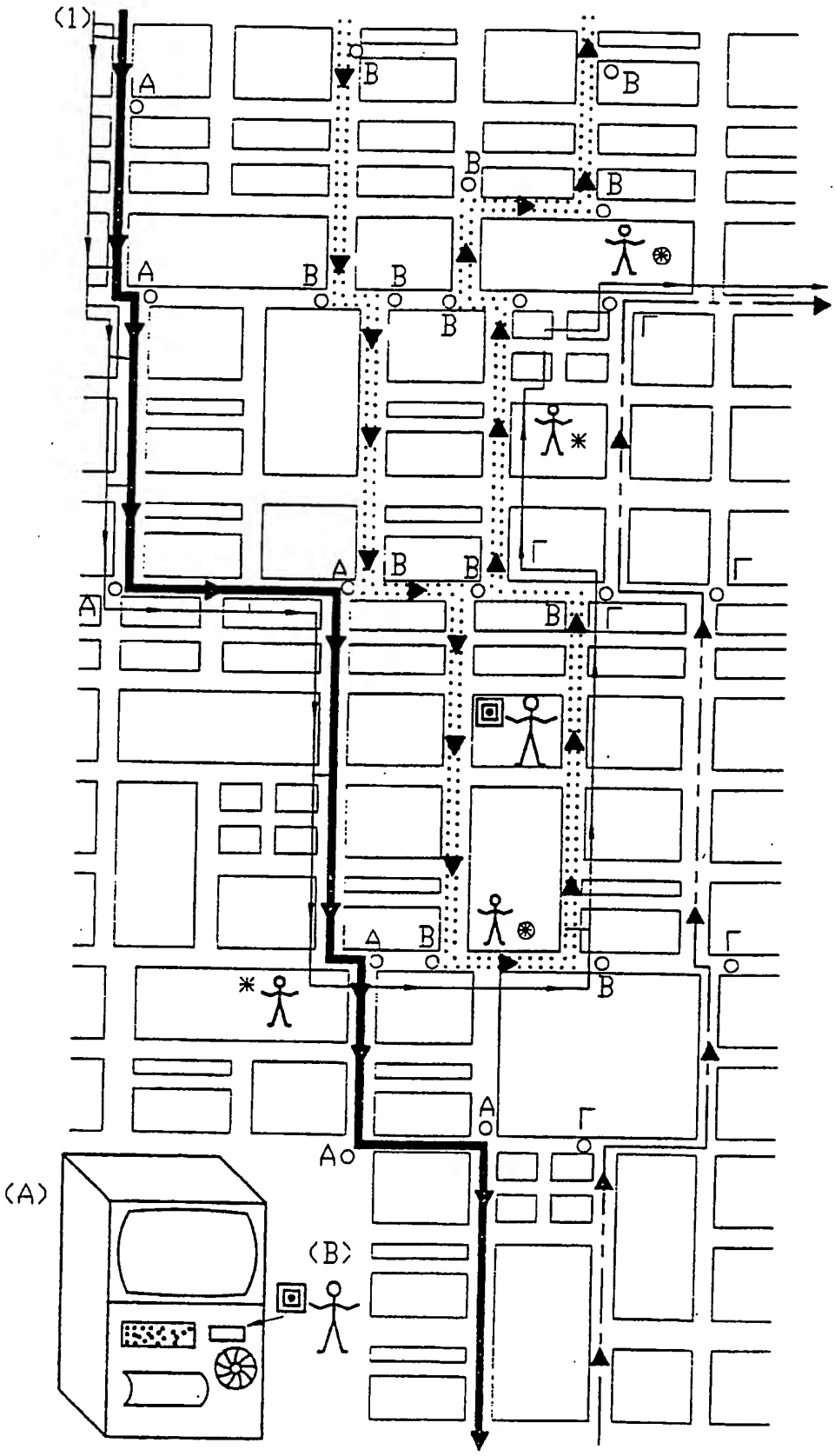
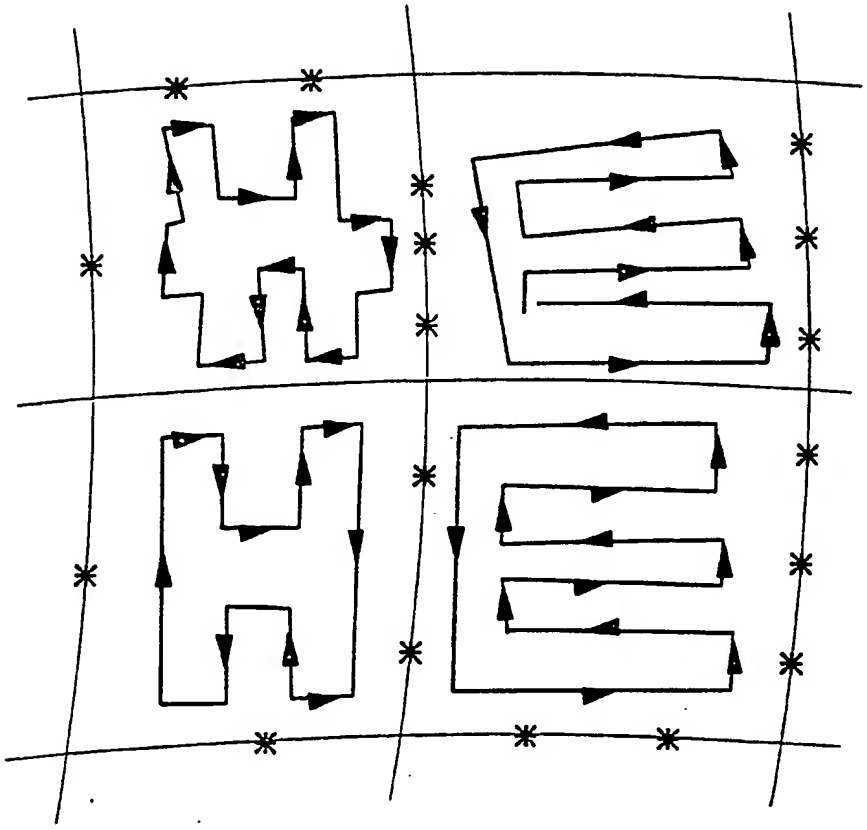



FIGURE 7



* POINTS OF CORRESPONDENCE AND COORDINATION

FIGURE 8

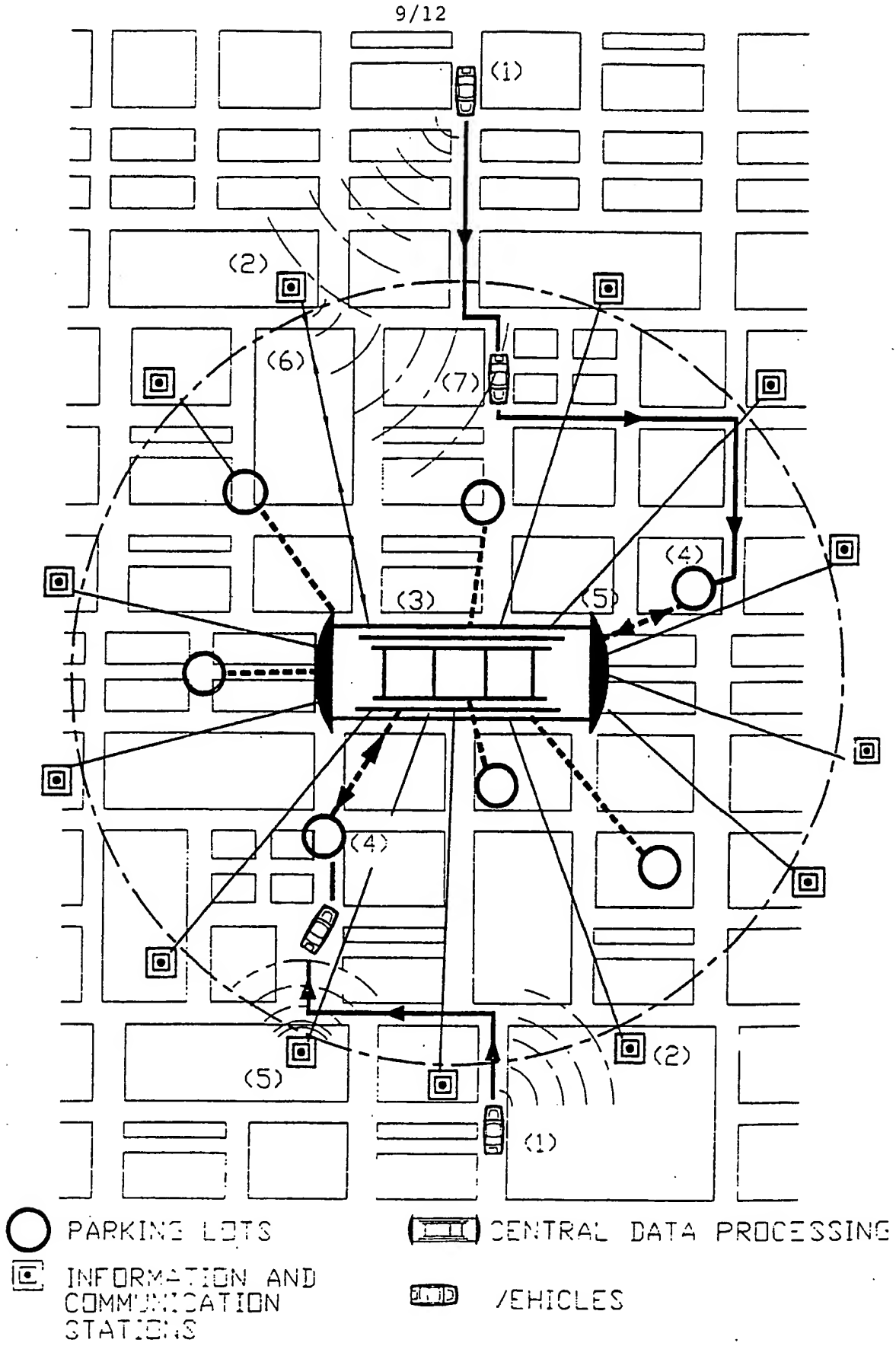



FIGURE 9

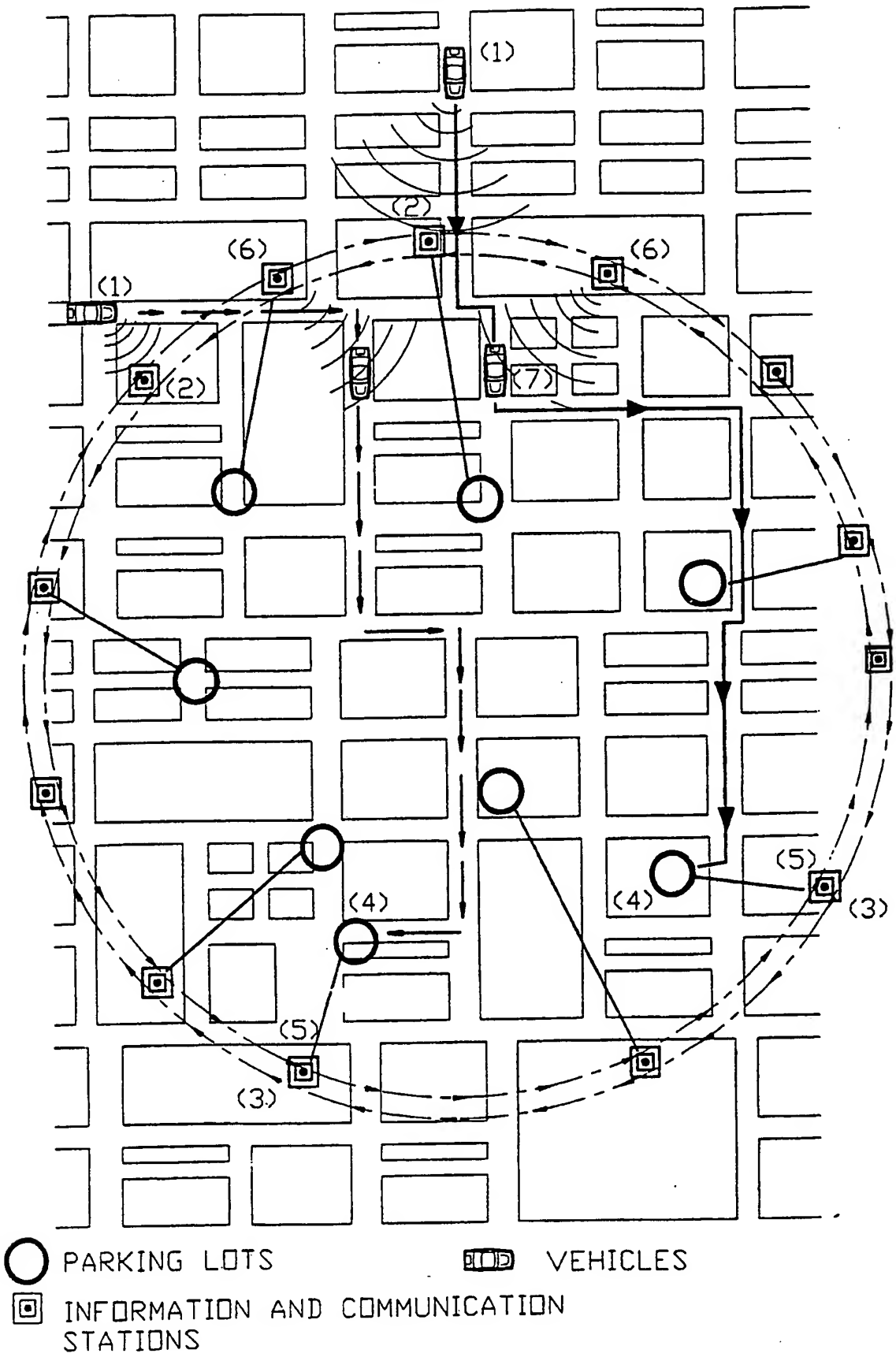
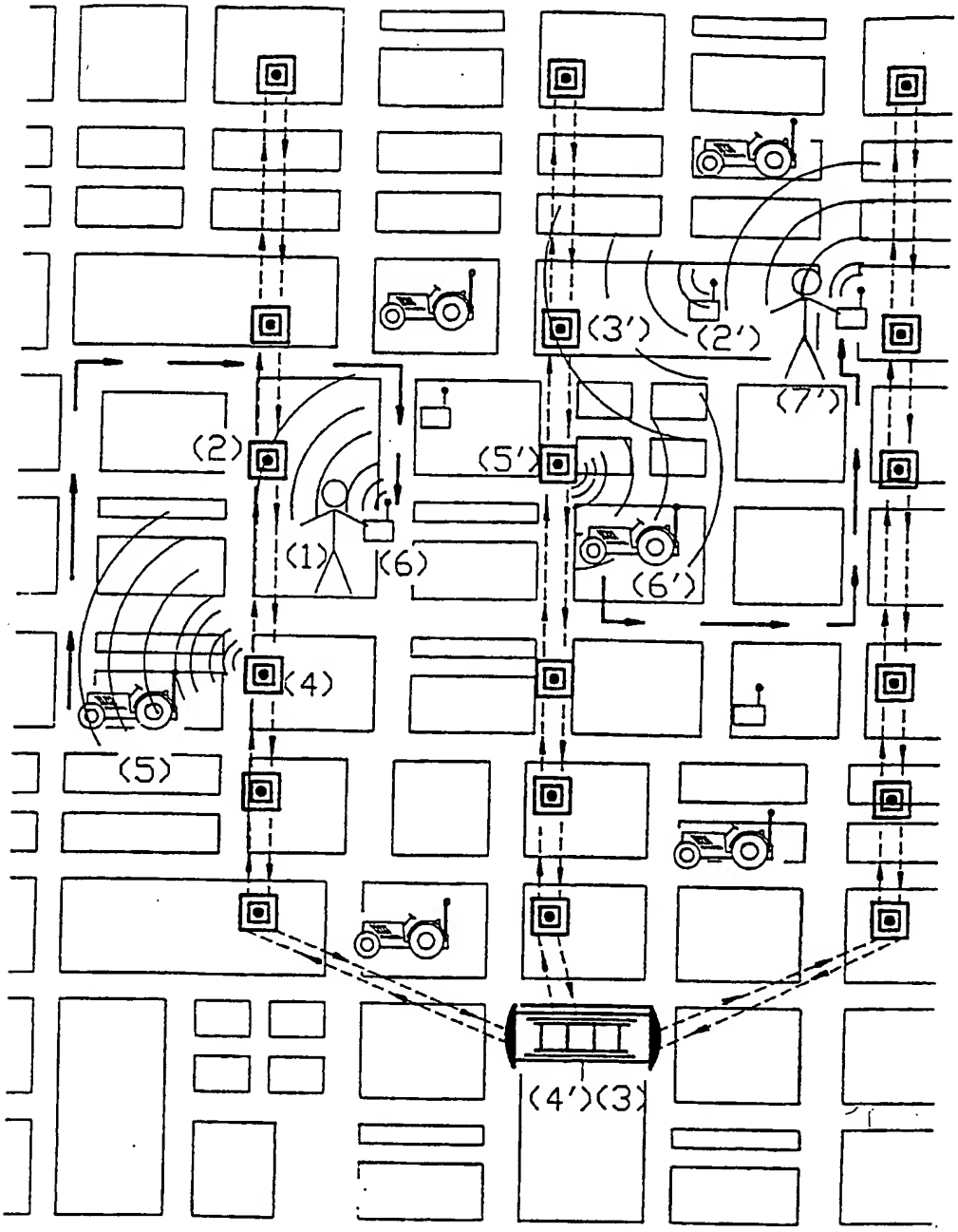

(1)
(2)
(6)
(6)
(1)
(2)
(7)
(4)
(4)
(5)
(3)
(5)
(3)
PARKING LOTS
VEHICLES
INFORMATION AND COMMUNICATION STATIONS

FIGURE 10




CENTRAL DATA PROCESSING AND COMMUNICATION UNIT (CCU)

EMERGENCY UNITS

PORTABLE PERSONAL INFORMATION AND COMMUNICATION DIVICES (PPI)

INFORMATION AND COMMUNICATION STATIONS (ICS)

FIGURE 11

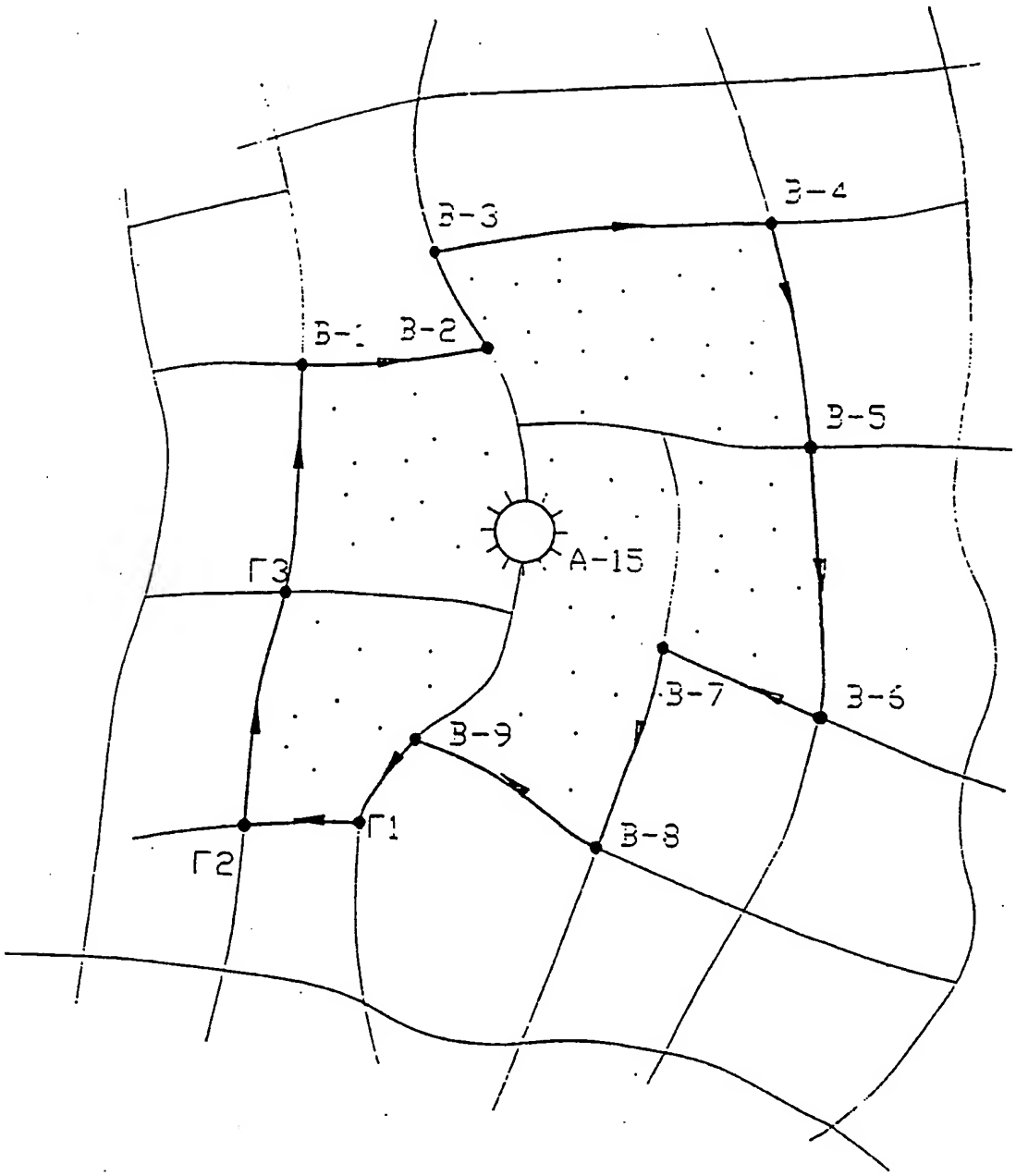



FIGURE 12

INTERNATIONAL SEARCH REPORT

Inter[illegible]ication No
PCT/GR[illegible]/00020

A. CLASSIFICATION OF SUBJECT MATTER
IPC 5 G08G1/0968 G08B25/01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 5 G08G G08B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | WO,A,82 02271 (SMEDEMA) 8 July 1982<br>see the whole document | 1 |
| A | EP,A,0 380 075 (FUJITSU LIMITED) 1 August 1990<br>see the whole document | 1 |
| A | GB,A,2 218 243 (LIONEL LESLIE NEWBY) 8 November 1989<br>see the whole document | 1 |
| A | US,A,3 787 811 (HILGEDICK) 22 January 1974<br>see the whole document | 1 |
| A | WO,A,89 07304 (MESSERSCHMITT-BÖLKOW-BLOHM) 10 August 1989<br>see the whole document | 1 |

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 26 January 1994 | 04. 02. 94 |

| Name and mailing address of the ISA | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl,<br>Fax (+ 31-70) 340-3016 | Wanzeele, R |

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| | Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|---|
| 4 | A | RESEARCH DISCLOSURE<br>no. 339 , July 1992 , HAVANT GB<br>pages 540 - 541<br>'Vehicle Distress System'<br>see the whole document | 1 |
| 4 | A | NTT REVIEW<br>vol. 3, no. 6 , November 1991 , TOKYO JP<br>page 5<br>'Marketing of SR10 Emergency Call System Initiated'<br>see the whole document | 1 |
| 1 | A | IEEE TRANSACTIONS ON VEHICULAR TECHNOLOGY<br>vol. 40, no. 1 , February 1991 , NEW YORK US<br>pages 132 - 140<br>I.CATLING ET AL 'Road Transport Informatics in Europe---Major Programs and Demonstrations'<br>see the whole document | 1 |
| 3 | A | MESURES REGULATION AUTOMATISME<br>vol. 51, no. 3 , March 1986 , PARIS FR<br>pages 39 - 44<br>PEYRUCAT 'Autoroutes et brouillard:limiter les risques'<br>see the whole document | 1 |
| 7 | A | VNIS'89,SEPTEMBER 11-13,1989 IEEE US<br>pages 427 - 431<br>HILTON 'The Removal of Parking Search Traffic from the Town Centre'<br>see the whole document | 1 |
| 2 | A | IBM TECHNICAL DISCLOSURE BULLETIN.<br>vol. 29, no. 1 , June 1986 , NEW YORK US<br>pages 385 - 387<br>'TRANSPORTATION INFORMATION DISTRIBUTION SYSTEM'<br>see the whole document | 1 |
| 4 | A | EP,A,0 242 099 (ADVANCED STRATEGICS,INC.)<br>21 October 1987<br>see the whole document | 1 |
| 1 | | | |

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

| Patent document cited in search report | Publication date | Patent family member(s) | | Publication date |
|---|---|---|---|---|
| WO-A-8202271 | 08-07-82 | NL-A- | 8007077 | 16-07-82 |
| | | AU-A- | 8005882 | 20-07-82 |
| | | EP-A- | 0067843 | 29-12-82 |
| EP-A-0380075 | 01-08-90 | JP-A- | 2195738 | 02-08-90 |
| | | US-A- | 5140308 | 18-08-92 |
| GB-A-2218243 | 08-11-89 | US-A- | 4990890 | 05-02-91 |
| US-A-3787811 | 22-01-74 | NONE | | |
| WO-A-8907304 | 10-08-89 | DE-C- | 3802337 | 13-07-89 |
| | | EP-A- | 0396590 | 14-11-90 |
| | | JP-T- | 3502142 | 16-05-91 |
| EP-A-0242099 | 21-10-87 | CA-A- | 1277400 | 04-12-90 |
| | | JP-A- | 63024395 | 01-02-88 |